EXPLORING RISK PERCEPTION IN A NATIVE HAWAIIAN COMMUNITY ON O‘AHU

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Dedication

For my mom, and Tricia, and Wyatt.

For everyone who will come after.

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- Thank you to those who went before.
- Thank you to all the teachers who provided me a foundation on which to start.
- Thank you to my wife, Tricia who has supported me through more schooling than she wanted to endure. And for bringing Wyatt into the world, without the two of them, I would have quit this process.
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Abstract

Purpose. Disasters pose a significant risk to the residents of Oʻahu. One of the most effective ways to save lives and reduce loss is preparedness. A vital element in understanding preparedness measures is determining if people see themselves at risk. Many factors influence risk perception, including age, gender, culture, and ethnicity. Owing to this understanding, Native Hawaiians may have a unique perception of risk. Paton's social cognitive model was used to frame risk perception's role in exploring how Native Hawaiians living in the community of Papakōlea on Oʻahu view their risk from natural disasters.

Methods. A qualitative study using photovoice was conducted, wherein participants chose photos to communicate their concerns for disaster risks. A collaborative thematic analysis was performed, and illuminated themes were paired with the participants' images.

Results. Sixteen (n=16) members of the community participated, ten women and six men organized into three age cohorts, 18-37, 38-57, and 58+. After reviewing 115 photos, participants selected nine to represent their concerns and identified five themes: natural conditions and processes, access in and out of the community, physical safety, threats beyond their control or understanding, and responsibility for family.

Discussion. Participants saw erosion, overgrown vegetation, and flooding as risk factors. The upkeep of homes, roads, and property were also seen as threats. Participants worried that access in and out of the community might put them in danger during a disaster. Threats beyond the immediate community caused significant anxiety. The most critical concern to participants was their family and other community members.

Keywords: disaster preparedness, Native Hawaiians, Photovoice, risk perception

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CHAPTER 1: INTRODUCTION

This dissertation explores the significance of risk perception (RP) related to disaster preparedness and the role RP plays in community disaster planning. The author discusses the need for greater understanding of RP in the State of Hawai‘i based on the threats jeopardizing residents and the unique community environment. Disaster planning is essential to nursing because of the relationship nurses have with the communities they serve and the breadth of nursing’s scope and responsibility. The researcher establishes the need to investigate RP as it is conceptualized in specific communities. The aim of this study was to explore RP among Native Hawaiian residents of the Papakōlea community on O‘ahu.

Disasters

The frequency and severity of natural and manmade disasters are increasing throughout the world. Driven by socioeconomic and climate issues, people are moving into already overpopulated urban settings (Burkle, 2014), and as a result, coastal metropolitan centers are becoming overcrowded. These shifts affect cities around the world, putting greater stress on urban infrastructure and increasing the vulnerability of global populations (Burkle, 2014; United Nations Office for Disaster Risk Reduction, n.d.; World Health Organization, n.d.).

Examples of the threats disasters pose include tidal waves, falling buildings, and hurricanes (International Federation of Red Cross and Red Crescent Societies, n.d.-a). Pesiridis, Sourtzi, Galanis, and Kalokairinou (2015) explained that natural and manmade disasters influence the lives of billions of people around the globe. The authors estimated that nearly 2 million people lost their lives, 4.2 million were injured, and 33 million were left homeless due to disasters between 2000 and 2015.

Defining disasters is a critical step in understanding how to plan for and respond to them. Agencies and policymakers often consider effects related to the scale of the event when determining disaster categories. Definitions place varying degrees of importance on different aspects of disaster outcomes. Explanations also place differing degrees of emphasis on the effects on social systems and community networks (Greene, Turley, Mann, Amlot, Page, & Palmer, 2014; Landesman, 2011; Rozakis, 2007). The International Federation of Red Cross and Red Crescent Societies (IFRCRCS) focuses more on the event and physical outcomes than people and their reaction. The IFRCRCS (n.d.-b) states:

> A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins. (para. 1)

The Centers for Disease Control and Prevention's (CDC) definition highlights how people and social systems are affected (CDC, 2014). According to the CDC, "a disaster is a serious disruption of the functioning of society, causing widespread human, material or environmental losses, that exceeds the local capacity to respond, and calls for external assistance" (para. 1). The CDC's definition emphasizes the outcome of an event and the inability of local authorities to respond. This important distinction draws attention to the idea that an event becomes a disaster when the people affected cannot respond adequately.

Risk mitigation and preparedness empower communities and individuals to react to calamitous events without the need for outside assistance or widespread systems failure (FitzGerald, Tarrant, Aitken, & Fredriksen, 2017; Landesman, 2011). Zach (2009) characterized

disasters as, “unwanted by those affected by them, although not always unpredictable” (p. 7), a definition that stresses the opportunity to plan before an event takes place. The chance to reduce potential adverse outcomes before they take place and organize useful systems to respond is the cornerstone of disaster planning.

Disasters are categorized as natural or manmade, fast or slow moving. Natural disasters are those caused by nature, acts of God, or forces typically thought to be out of human control (Landesman, 2011; Zack, 2009). Examples include earthquakes, hurricanes, tsunamis, tornadoes, floods, landslides, and drought (International Federation of Red Cross and Red Crescent Societies [IFRC], n.d.-a; Landesman, 2011). Manmade disasters include famine, displaced populations, industrial or transportation accidents, and war (Landesman, 2011). Fast-moving disasters include earthquakes and tornadoes; these short-lived events strike without warning (Climate and Migration Coalition, n.d.; IFRC, n.d.-a). These events are unpredictable and unfold so quickly that there is no time for last-minute planning.

Slow-moving disasters differ from fast or sudden disasters in that they often have no single climactic event (Landesman, 2011). Famine, sea-level rise, and wars are examples of slow-moving disasters, which typically provide communities time to prepare, evacuate, or otherwise respond. Some debate exists regarding the ability to plan for various types of disasters. Disaster management discourse suggests some disasters are more readily prepared for than others, while some events are considered so rare or improbable that they cannot be anticipated (Landesman, 2011; Zach, 2009).

A response to the notion that particular events cannot be planned for is the all-hazards approach, which seeks to ready communities and responders for an overarching "typical"

disaster, thus providing a preparatory opportunity for all occasions (CDC, 2013). Illuminating ways to prepare for disasters and mitigate hazards in light of growing risks is of increasing importance to community and public health (Greene, Turley, Mann, Amlot, Page, & Palmer, 2014; Paton, 2007). Slepski (2005) drew attention to the threat of large-scale events, emphasizing manmade events as well as natural disasters. Her work pointed to the stress those events place on federal and local government readiness. Slepski and others have called for alignment of the healthcare fields, other emergency planning professions, and the public to maximize preparedness efforts (Gowan, Sloan, & Kirk, 2015; Yamamoto, 2013). Disasters are concerning to nursing because of the role nurses have in healthcare and their responsibility to both plan for and respond to disasters.

Nursing

Nurses have played a crucial role in disaster preparedness and disaster response for as long as there have been nurses; their increasing leadership role has been recognized for more than a decade, as the severity and consequences of disasters have increased (Gebbie & Qureshi, 2006). Growing literature demonstrates how nurses are particularly well-positioned to respond to disasters due to their numbers, understanding of communities, and extensive training (Landesman, 2011; Li, Turale, Stone, & Petrini, 2015; Veenema et al., 2016; Yamamoto, 2013).

As the largest group of healthcare professionals, participating in all aspects of care across the lifespan and a vast array of settings, nurses are already in communities, ready to contribute to disaster preparedness and response (Pesiridis et al., 2015; Veenema et al., 2016). There are nearly 3 million nurses in the United States working across the healthcare spectrum, including health management, public health, environmental health, school-based nursing, and acute care

(Bureau of Labor and Statistics, 2018). Because of the scope of their work and the multitude of environments where nurses interact with the public, nurses have a unique understanding of the communities they serve (Gebbie & Qureshi, 2006; Slepski, 2005; Veenema et al., 2016).

With the knowledge that not all hazardous events become disasters nurses can mitigate risks and guide preparedness efforts. Preparedness includes all the actions that take place before an event becomes a disaster (Slepski, 2005). The emphasis on preparedness has intensified parallel to the increased threat and mounting consequence of disasters worldwide (Burkle, 2014; Christoplos, Mitchell, & Liljelund, 2001; Gowan et al., 2015; Paton, 2003; Slepski, 2005).

Preparedness

The goal of preparedness is to enhance the capacity to respond to a spectrum of individual and organizational needs in anticipation of hazardous events (FitzGerald et al., 2017; Landesman, 2011). Slepski (2005) explained that emergency preparedness is achieved through a process involving planning, education, and exercises. She emphasized the effort of federal, state, and local authorities to develop preparedness at all organizational levels. The preparedness process seeks to reduce, or eliminate, potential consequences posed by recognized hazards (Haigh, n.d.; Landesman, 2011). Christoplos et al. (2001) explained that mitigating risk involves reducing the possible destructive outcomes of disastrous events as well as "ensuring the readiness of a society to forecast, take precautionary measures and respond to an impending disaster" (p. 186).

Figure 1.1 shows the Disaster Cycle or Disaster Management Cycle (DMC) (Haigh, n.d.; Khan, Vasilescu, & Khan, 2008). The coloring in the figure draws attention to the post disaster phases Response and Recovery in yellow and red. The DMC organizes events into two phases.

Pre-event actions are taken before a disaster, and post-event actions are triggered in reaction to a disaster. These two phases form the complete and ongoing cycle. The DMC is useful for understanding where an activity fits in the ongoing process of emergency management. The pre- and post-event phases are further divided into: a) mitigation, b) preparedness, c) response, d) recovery. A disaster event takes place between the preparedness and response phases. It is essential to understand that each stage becomes a part of the following interval. Therefore steps taken in mitigation lead to preparedness. Training that happens during preparedness is implemented in the response phase, and the response phase aims to address the immediate needs of people and communities affected by the event (Haigh, n.d.; Khan et al., 2008; Landesman, 2011).

Figure 1.1. The Disaster Management Cycle (Vancouver Island Health Authority, 2013)

Recovery is a long process, possibly lasting years, and recovery actions often lead to changes that take place in the mitigation phase of the next event (Haigh, n.d.; Khan et al., 2008; Landesman, 2011). The importance of understanding actions within the DMC as an ongoing

integrated process cannot be overstated. Haigh (n.d.) explained, “Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle” (p. 4). Preparedness cannot be thought of as a collection of discrete events taking place or implemented separately from one another. Neither can agencies, regardless of their scale, be thought of as independent actors in the process. Actions are built on and connected to other actions, and actors function in a web of interconnectedness and interdependence (Christoplos et al., 2001; Khan et al., 2008; Patterson, Weil, & Patel, 2010).

A crucial aspect of preparedness involves knowing what to prepare for and understanding why preparation is essential (Khan et al., 2008; Slepski, 2005). Preparedness literature emphasizes the need to plan and be ready to respond to an event or mitigate factors that potentiate a disaster (Gowan et al., 2015; Haigh, n.d.; Khan et al., 2008; Landesman, 2011; Paton, 2003; Paton & Johnston, 2001). The literature, however, often fails to discuss the complexity of the interacting factors that lead individuals, communities, or agencies to prepare (Abramson, 2007; Landesman, 2011; Paton, 2003; Paton & Johnston, 2001). Risk perception is a critical precursor of preparedness. Risk perception is a vital motivational force that works to change behavior in anticipation of adverse consequences (Abramson, 2007; Landesman, 2011; Paton, 2003; Paton & Johnston, 2001; Slepski, 2005; Slovic, 2000).

Risk Perception

Risk perception is the awareness of the potential consequences of an event. Bradford et al. (2012) described RP “as a combination of awareness, worry, and preparedness” (p. 2307). Developing RP is a complicated process; RP is neither easily described nor explained because it

means something different in and across different groups of people (Gierlach, Belsher, & Beutler, 2010; Greene et al., 2013; Slovic, 2000). Risk perception is a cognitive awareness of the potential negative consequences of a specific event or series of events (Slovic, 2000). Risk perception and preparedness are connected and work to influence one another. As people become aware of and concerned about a threat, they are more likely to take action to protect themselves. As they prepare, their perception of risk changes; they may better understand hazards and feel greater danger, or they may feel better equipped to deal with a crisis (Paton, 2003; Slepski, 2005; Slovic, 2000; Tatsuki et al., n.d.).

Risk perception plays a crucial role in decision-making where outcomes are variable and potentially costly (Slovic, 2000). People think about risk in an abstract way, structured predominantly in two categories. First, they perceive risk as a feeling, intuiting a spontaneous reaction, and responding based on emotional interpretation. Alternatively, they analyze risk, weighing possible outcomes, calculating costs and benefits, and imagining various scenarios (Slovic, Finucane, Peters, & MacGregor, 2004; Slovic & Peters, 2006). Slovic, Finucane, Peters, and MacGregor (2004) respectively called these two methods the “experimental system” and the “analytic system” (p. 311).

Slovic et al. (2004) explained the analytic system as being logical and formal; it functions as a kind of equation in the mind, requiring effort and time. The experimental system is fluid and fast; it seems to work on its own, giving people answers in the moment. The experimental system is based on images at hand and experiences that come quickly to mind, such as previous encounters with disasters. Most people use a combination of both methods working in parallel to make decisions on a day-to-day basis (Slovic et al., 2004).

Formal risk analysis favors the analytic system and assumes a rational process by decision makers. Slovic et al. (2004) suggested that both ways of thinking about risks have to be understood by professionals in fields requiring an understanding of how people make decisions where risk is evaluated. Building an understanding of how people come to conclusions about risk and what motivates them to take action is central to encouraging disaster planning. Further, both modes of thinking are essential to disaster planning because they offer insight into decision making at different times concerning a disaster event. Slovic and Peters (2006) described how analytic thinking characterizes the process that takes place in the mitigation and preparedness phases; it allows for careful examination and deliberate action. The authors depicted the experimental system or "risk as feeling" as a way of making decisions in the heat of the moment and in real time, essentially how decisions are made in the response phase or during an event.

Perceived risk vs. actual risk. Perceived risk is a threat a person or group of people are aware of. Perceived risk is the sum of what is known by an individual or organization and how that individual or organization feels they should respond (Slovic, 2000). Slovic (2000) explained that perceived risk is not an analysis or single calculation and does not adhere to a straightforward process. Peoples' perceptions of their surroundings vary by group and are dependent on what they see and to what they ascribe meaning to (Gierlach et al., 2010; Slovic, 2000). A multitude of factors can influence perceived risk, including: age, sex, socioeconomic status, culture, ethnicity, nationality, health status, and previous history related to potential threats. A compressive list of causes is beyond the scope of this paper (Abramson, 2007; Slovic, 2000). This process is complicated and does not hold to a single definition or model. Despite the difficulty in determining how people become aware of threats, perceived risks constitute what is

known to the decision-maker(s) and how they interpret the consequences of action or inaction (Slovic, 2000).

Actual risk represents measured threats, or known hazards, but can include unknown threats and what-if outcomes (Slovic, 2000). Actual risk is sometimes derived by mathematic or statistical analysis performed by risk experts or agencies outside the threatened community. Siegrist (2013) explained research involving flood risk demonstrates there is minimal association between RP and the actual danger to which people are exposed. The literature repeatedly shows the difference between perceived and actual risk, emphasizing that decisions are made based on perceived rather than actual risk (Bradford et al. 2012; Burns & Slovic 2012; Pennings & Grossman, 2008; Slovic, 2000; Smith, 2008; Strotmeyer & Lystad 2017). This phenomenon is consistent across cultures, regardless of scale, type of threat, or severity of the danger (Burke, Bethel, & Britt, 2012; Paton, 2007; Peters, & Slovic, 2014; Schultz, & Annas, 2012; Slovic, 2000; Smith, 2008; Vastfjall, Peters, & Slovic, 2014).

Perceived risk and actual risk are further complicated by the fact that people can be aware of risk and choose not to act. Individuals can be conscious of hazards, understand information describing potential dangers, and still choose not to prepare themselves. Bradford et al. (2012) suggested that, if individuals are not afraid of outcomes, then they will not be motivated to respond. For this reason, disaster planners have to determine perceived risk and the fear of consequences felt by the people and communities they serve. Planners have to establish the difference between the community's concern and risks the planner believes the community faces (Greene et al., 2013; Spiekerman, Kiennberger, Norton, Briones, & Weichselgartner, 2015; Tatsuki et al., n.d.).

Taking action to change. Understanding how people assess their need to act and helping them take appropriate action should be a priority for disaster planners. Nurses working in the field of disaster planning should determine how the communities they serve understand risk and what the community feels is worth taking action to protect (Rozakis, 2007). Current literature demonstrates that providing information alone is not enough because knowledge alone does not motivate change (Dalisay & De Guzman, 2016; Gierlach et al., 2010; Rozakis, 2007). Paton (2003) provided a theoretical model explaining how people decide to take action to prepare for disasters (Figure 1.2). Paton (2003) suggested that there are three factors leading to disaster preparedness. He identified risk perception, critical awareness of hazards, and hazard anxiety as the motivators for change (Paton, 2003).

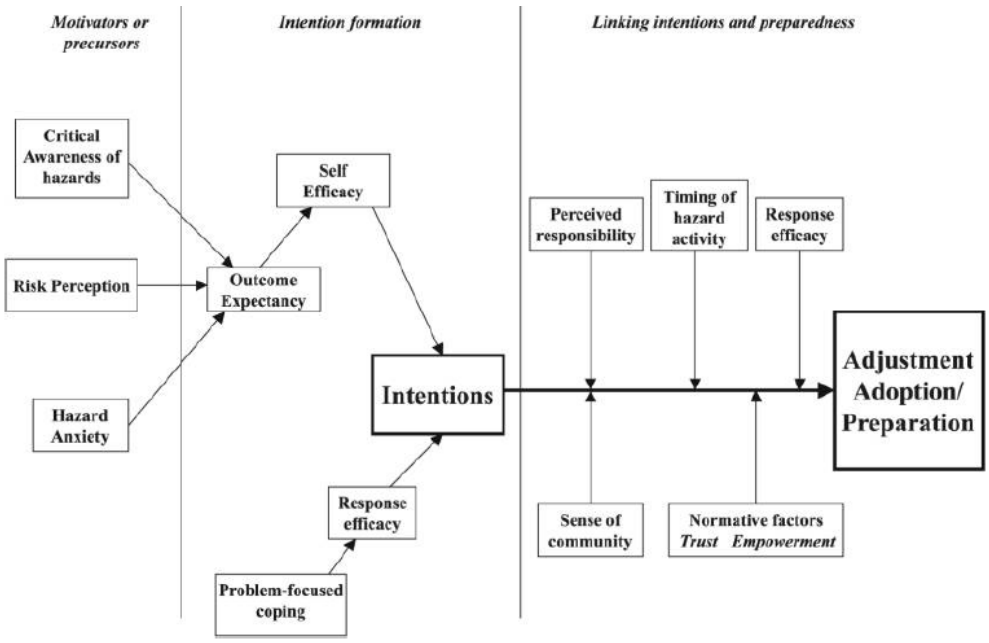

Figure 1.2. Paton's (2003) Social Cognitive Model illustrating RP as a precursor to preparedness.

Slepski's (2005) analysis of disaster preparedness supported Paton's (2003) model. She identified awareness of the environment, perceived threat, and identification of training needs as antecedents to disaster preparedness. She stressed that individuals must believe they are at risk before they take action to change.

Community contextual aspects. Formal risk assessments, the method typically used to develop policy, often fail to appreciate the process by which communities construct and respond to risk (Dalisay & De Guzman, 2016; Spiekermann et al., 2015; Usuzawa et al., 2014; Xu, Zhang, Liu, & Xue, 2014). The gap between official policy definitions and the public's conception of risk can reduce the public's confidence in disaster management processes (Bradford et al., 2012; Slovic, 2000; Spiekermann et al., 2015). Bradford et al. (2012), in their study of flood risk management, stressed the need to determine how the public understands risks

and characterizes it amongst themselves. The authors suggested definitions should come from communities as a means to improve communication and participation.

Greene et al. (2014) explained that how people respond to threats is a function of opportunities within their existing social systems. Community definitions and ideas about risk are generated in a conceptual framework resulting from and within a community's environment (Dalisay & De Guzman, 2016; Greene et al., 2014). Communities that are best able to respond to an event are those who have strong networks and well-developed relationships (Greene et al., 2014; Paton, 2007; Paton & Johnston, 2001). Responsive communities also share information and have more consistent RP among community members (Dalisay & De Guzman, 2016; Gierlach et al., 2010; Tatsuki et al., n.d.).

The dynamics within a community are a dominant influence on RP because they act as the basis for perceiving threats and ascribing value to possible outcomes (Dalisay, & De Guzman, 2016). Nascent understanding of the community's central role in how communities plan illustrates the need to incorporate community contextual aspects in assessing RP from beginning to end (Dalisay, & De Guzman, 2016; Gierlach et al., 2010; Masuda, & Garvin, 2006).

Disasters in Hawai‘i

Isolated in the Pacific Ocean nearly 2,500 miles from the continental United States, Hawai‘i is threatened by a multitude of hazards. The Pacific Disaster Center (n.d.) cautions residents to be aware of earthquakes, tsunamis, tropical hurricanes, and floods. The state's isolation compounds these hazards. Despite significant threats to the state, there is little information regarding RP in specific communities.

An estimated 1,427,538 people live in Hawai‘i, and of those 988,650 live on O‘ahu (United States Census Bureau, n.d.-a & n.d.-b). The population of Hawai‘i is varied; people from many cultural backgrounds from across the Pacific and around the world live in Hawai‘i. Hawai‘i’s cultural milieu is a combination of American mainland culture, Asian culture, Pacific Islanders, and the indigenous culture of Native Hawaiians (McDermott & Andrade, 2011). This serves as a challenge to disaster planners working to accurately assess RP and communicate potential threats to various communities across the state. Seeking the perspective of community members might help disaster planners to understand how community factors work to formulate RP.

Native Hawaiians

Native Hawaiians are the indigenous people of Hawai‘i who lived on the islands before contact with Europeans (McDermott, & Andrade, 2011). Like Native Americans, Native Hawaiians faced a rapid decline in population during the 19th and 20th centuries (McCubbin & Marsella, 2009). Estimates suggest more than 90% of the total population of Native Hawaiians died in the first 100 years after contact with Europeans (McCubbin & Marsella, 2009). McCubbin, McCubbin, Zhang, and Kehl (2013) described the negative consequences on Native people who have survived colonization, genocide, and systematic marginalization. The effects are visible in increased rates of cancer, respiratory disease, stroke, diabetes, heart disease, and obesity compared to non-indigenous populations (Davis, 2010; Kaholokula, Nacapoy, & Dang, 2009). Collectively these factors contribute to the vulnerability of Native Hawaiians to the consequences of natural disasters (Kamehameha Schools Strategic Planning and Implementation Division, 2014; Moy, Sallis, & David, 2010).

Vulnerability assessments typically identify people with preexisting health concerns at higher risk than people not burdened by illness (FitzGerald et al., 2017; Landesman, 2011). Other factors contributing to vulnerability include: gender, age, education level, and a plethora of social and environmental factors (FitzGerald et al., 2017; Landesman, 2011). Chronic health conditions are more prevalent in the older Native Hawaiian population than in other ethnic groups in Hawai‘i (Kaholokula et al., 2003; State of Hawai‘i, 2006). These issues are exacerbated by a decreased capacity to respond due to political marginalization, poverty, environmental threats, and discrimination (Kaholokula et al., 2003; Kim, Yang, & Hwang, 2006; McCubbin, McCubbin, Zhang, & Kehl, 2013).

Native Hawaiians tend to be younger and earn less money than non-Hispanic whites in Hawai‘i (McCubbin & Marsella, 2009; USCB, n.d.). Hawaiians are more likely to be unemployed or underemployed (White House Initiative on Asian Americans and Pacific Islanders, n.d.). McCubbin and Marsella (2009) drew attention to the fact that Native Hawaiians are more likely to live with considerably more people in single homes because they often live with family members of multiple generations. These elements put Native Hawaiians at increased risk for the consequences of disasters. Each of these issues individually and more importantly, collectively, reveal significant vulnerability (FitzGerald et al., 2017; Landesman, 2011).

Despite this vulnerability, there may be specific aspects of Hawaiian culture or dynamics of Hawaiian communities that are supportive during disasters, fostering the capacity to respond to a crisis. Factors that support the community amplify individual and community resiliency and may strengthen populations in ways previously unrecognized (Bakkensen, Fox-Lent, Read, & Linkov, 2017; Cutter, Boruff, & Shirley, 2003; Paton, Bajek, Okada, & McIvor, 2010; Paton &

Johnston, 2001; Patterson, Weil, & Patel, 2010). The literature indicates that culture and community play a role in shaping RP and attitudes toward disasters; however, the specific outcomes are poorly understood (Dalisay, & De Guzman, 2016; Gierlach et al., 2010; Slovic, 2000). McCubbin et al. (2013) stressed the importance of understanding and incorporating the worldview of Native people in efforts to create programs to address historical injustices and projects to improve their present-day resiliency. An approach that includes Hawaiians aligns with the growing body of disaster readiness literature that emphasizes community engagement in all phases of emergency management (Morrow, 1999; Paton, 2007; Patterson et al., 2010; Pearce, 2003; Pelling, 2007). Further, Native Hawaiians may have unique understandings of the natural environment that may contribute to their RP and response to potential threats (Mercer, Dominey-Howes, Kelman, & Lloyd, 2007; Mercer, Kelman, Taranis, & Suchet-Pearson, 2010; Walshe & Nunn, 2012). Exploring RP from the perspective of Native Hawaiians would help disaster planners understand if existing risk assessments match perceived risk within Native Hawaiian communities (Bakkensen et al., 2017; FitzGerald et al., 2017; Paton & Johnston, 2001). This information could, in turn, improve risk communication, potentially alleviating the undue burden on the original inhabitants of the islands (Kaholokula et al., 2003; FitzGerald et al., 2017; Paton, 2007; Paton et al., 2010).

Papakōlea

Papakōlea is unique for many reasons. Being a Hawaiian Homestead, the residents of Papakōlea have to be at least 50% Native Hawaiian, defined as “any descendant of not less than one-half part of the blood of the races inhabiting the Hawaiian Islands previous to 1778” (Department of Native Hawaiian Home Lands [DHHL], 2018a, para. 4). New rules now allow

children of at least 25% Hawaiian blood quantum to take responsibility for a lease in Papakōlea (DHHL, 2018b). Most of the families in Papakōlea have been a part of the community for multiple generations (A. Dillard, personal communication, August 2015). The multigenerational relationships, familiar geographic setting, and shared ethnic background make Papakōlea an ideal location to explore RP.

As a community, Papakōlea shares the same risk factors as many other areas on Oʻahu but may have different perceptions of risk. The community is composed of three sections, Papakōlea, Kewalo, Kalāwahine. There is limited access to these neighborhoods with only a single road running through Papakōlea and Kewalo and only one road in and out of Kalāwahine. Many of the houses in Papakōlea and Kewalo are built on steep hillsides, and these homes are often supported by wooden columns, putting them at higher risk during earthquakes (DHHL, 2009; Federal Emergency Management Agency, 2006). Other hazards include streams running through the community and undeveloped areas prone to wildfires (City and County of Honolulu, 2012; DHHL, 2009).

The median age of Papakōlea's residents (32.8) is slightly younger than the rest of Oʻahu (37.3) and the State (38.1), while the median income ($52,167) lags behind Oʻahu ($64,355) as well as the rest of the state ($63,746) (DHHL, 2009). These factors contribute to socioeconomic aspects of vulnerability (FitzGerald et al., 2017; Landesman, 2011).

Despite these challenges, many factors support the community's ability to respond to disasters. The familiarity among community members, their history with one another, and the trust they have developed over generations are recognized strengths (Marsella, Johnson, Watson, Gryczynski, 2008). Understanding of the natural and built environments are other advantages a

community with a long history and knowledge of place have in their favor (McCubbin et al., 2013; Mercer et al., 2007; Sharma, Gupta, & Shaw, 2009; Trinidad, 2012; Veitayaki, 2009).

In the spring of 2017, the researcher was approached by members of a community development organization in Papakōlea and asked to work with the community to help them better prepare for disasters. Community leaders explained that they hoped research would help the community better understand how to prepare for disasters. This opportunity grew from a relationship between the researcher and community leaders that started in 2013. As a clinical instructor for the University of Hawai‘i, the researcher conducted community health nursing clinicals in Papakōlea and had developed trust and familiarity with community members. Part of the researcher’s role as an instructor was working with students to develop community health interventions to support the community in a variety of ways. Building on existing relationships where trust exists is known to increase disaster preparedness and facilitate risk awareness (Cheung, 2018; Patterson et al., 2010; Rozakis, 2007; Slovic, 2000a).

Purpose of Study

Native Hawaiians may have unique cultural perspectives, which are likely to influence their disaster risk perception. The purpose of this study was to explore RP among Native Hawaiians living in the community of Papakōlea. Participants described their thoughts concerning risk for the consequences of natural disasters in their community. This chapter outlined the importance of disaster preparedness and described how preparedness is positioned in the scope of disaster management. As a precursor of preparation, RP is a crucial element of disaster planning. Because there is little information about RP in Hawai‘i, and the unique

perspective of Native Hawaiians within the broader community, an exploration of their beliefs and perceptions of risk is warranted and valuable to the field of nursing.

CHAPTER 2: LITERATURE REVIEW

Fundamental to the process of protecting communities from the consequence of disasters is active risk mitigation and corresponding preparedness. These steps are crucial functions of the disaster cycle, temporally positioned before catastrophes take place. The importance of the prevention phase cannot be overstated because it is within the pre-event period that actions have the most significant potential to alter the outcome of a potentially disastrous event (Haigh, n.d; Khan, Vasilescu, & Khan, 2008; Landesman, 2011, Paton & Johnston, 2001). During the pre-event phase, planners and communities can minimize or eliminate identified hazards, and at-risk populations can equip themselves to respond (Khan, Vasilescu, & Khan, 2008; Landesman, 2011; Paton, 2003; Paton & Johnston, 2001). This chapter introduces four conceptual models used in disaster research. A review of the literature related to risk perception is introduced. Finally, the proposed research question is explained.

Theories Exploring Disaster Risk Perception

Four conceptual models are routinely used in disaster research: (a) the theory of planned behavior (TPB); (b) the extended parallel process model (EPPM); (c) hazard proximity (HP); and (d) the social cognitive model (SCM). The model undergirding this research is Paton's (2003) social-cognitive preparation model.

Models used to frame disaster preparedness typically illustrate factors that contribute to at-risk communities and individuals taking action to protect themselves from identified threats (Ejeta, Ardalan, & Paton, 2015). Because the overarching goal of disaster research is to protect the public from hazards through risk mitigation and preparation, many models portray processes to motivate change and increase preparation (Landesman, 2011; Ejeta et al., 2015). The

conceptual models used in disaster research commonly identify the hazard, the person or people at risk, their capacity to understand the threat, and a temporal dynamic illustrating the time to respond before the hazard becomes a disaster (Arias, Bronfman, Cisternas. & Repetto, 2017; Burnkrant & Page, 1988; Basil, Basil, Deshpande, & Lavack, 2013; Ejeta, Ardalan, & Paton, 2015; Liska, 1984; Paton, 2003; Witte, 1992; Zhang, Hwang, & Lindell, 2010). These models may also account for specific characteristics of the persons involved, such as their race, age, sex, socioeconomic status, and previous experience with disasters (Abramson, 2007; Paton, 2003; Slovic, 2000). They may also include the threatened individual's capacity to respond to the hazard (Liska, 1984; Najafi, Ardalan, Akbarisari, Noorbala, & Elmi, 2017; Paton, 2003; Witte, 1992).

TPB. The theory of planned behavior is recognized for its capacity to explore antecedents of behavior (Burnkrant & Page, 1988; Najafi et al., 2017). Building on the work of Ajzen and Fishbein (1980), researchers using TPB work to identify how attitudes, social norms, and perceived behavioral controls affect specific actions (Burnkrant & Page, 1988; Najafi et al., 2017). The TPB model is grounded in an individual's behavioral intention and perception of control. The model lends itself to determining attitudes toward change and factors contributing to the development of specific feelings toward identified actions (Liska, 1984; Burnkrant & Page, 1988; Ejeta et al., 2015; Najafi et al., 2017). TPB is acknowledged for its capacity to predict intentions and behaviors (Najafi et al., 2017).

EPPM. The extended parallel process model seeks to offer guidance on how to respond to fear produced by communication of a given threat (Witte, 2008). According to the EPPM, fear is a dominant motivational driver that forces people to control danger or their fear of the danger

(Witte, 1992, 2008). The model seeks to define the severity of the perceived threat and the individual's capacity to respond to the situation (Popova, 2011; Witte, 1992, 2008). The extended parallel process model is concerned with the ability of individuals to act in reaction to a hazard that worries them; it is grounded in determining how individuals believe they can work in response to an event (Basil et al., 2013; Popova, 2011; Witte, 2008). The extended parallel process model is best for identifying individual responses and developing communication modalities to trigger the desired action in target populations (Barnett et al., 2014; Lewis, Watson, & White, 2013; Witte, 2008).

HP. Hazard proximity is often used as a factor in other models (Arias et al., 2017; Gotham Kevin, Campanella, Lauve-Moon, & Powers, 2017; Zhang et al., 2010). Hazard proximity functions in one of two ways: 1) a threat people should be aware of and have a plan to respond to, or 2) a factor used in deterring people's perceptions of risk or sense of danger (Arias et al., 2017; Cutter et al., 2008; Gotham Kevin et al., 2017; Slovic, 2000; Zhang et al., 2010). Hazard proximity models propose that greater proximity to a hazard will result in increased fear, RP, or sense of danger (Arias et al., 2017; Zhang et al., 2010). Hazard proximity is an uncomplicated approach to assessing RP, but it lacks nuance, as it does not account for a multitude of factors that may contribute to RP and relies heavily on the idea that experts know what people should worry about.

SCM. The SCM is another widely used model that seeks to illuminate the role of "cognitive, affective, emotional and social factors on preparedness" (Ejeta et al., 2015, p. 13). The SCM is routinely modified to account for factors that influence how people prepare (Ejeta et al., 2015; Espina & Teng-Calleja, 2015). Researchers using the SCM suggest that individual

factors play a significant role in both risk awareness and the motivation to act in response to recognized threats (Ejeta et al., 2015; Espina, & Teng-Callja, 2015; Paton, 2003). The variables working on an individual's choice to act are usually summarized as an ultimate intention to act or take action (Ejeta et al., 2015; Paton, 2003). Ejeta et al. (2015) explained that intention was identified as a dominant outcome of the model to "provide a common dependent variable when testing the theory on hazards that differed concerning their specific preparedness content" (p. 13).

Paton's adaptation of the SCM (2003) serves as the foundation for this research because of its emphasis on community as an essential factor and recognition of RP as an antecedent of preparedness. Paton's model is augmented by Abramson's (2007) concern for demographic considerations such as age, sex, education, and ethnicity. Paton's (2003) model is ideal for framing risk at the community level in an intimately connected community because it is holistic and accounts for the complexity of interrelated variables found in a community setting.

Paton, Smith, and Violanti (2000) described a relationship between feeling vulnerable and taking action to prepare for an event. Figure 2.1 illustrates the relationship between risks and the motivation to take action. The capacity to respond is an important aspect of addressing vulnerability because individuals and organizations who feel they can act to reduce negative outcomes have an opportunity to decrease vulnerability (Hellman, 2015; Paton & Johnston, 2001; Paton, Smith, & Violanti, 2000).

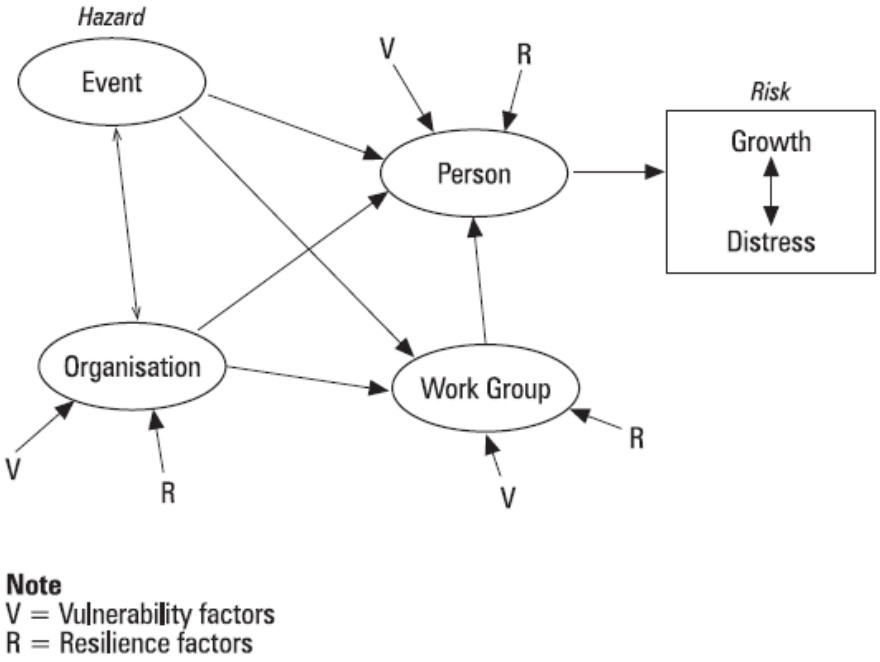

Figure 2.1. Paton's proposed risk management model (Paton et al., 2000)

Guided primarily by Paton's models, the author seeks further understanding of factors influencing RP. Abramson's (2007) Psychosocial Model of Emergency Preparedness is considered for its capacity to expand the conceptual framework by including greater emphasis on community context and demographic details. Abramson's model emphasizes the person's contextual position and characteristics; it incorporates factors such as age, ethnicity, income, and location (Figure 2.2).

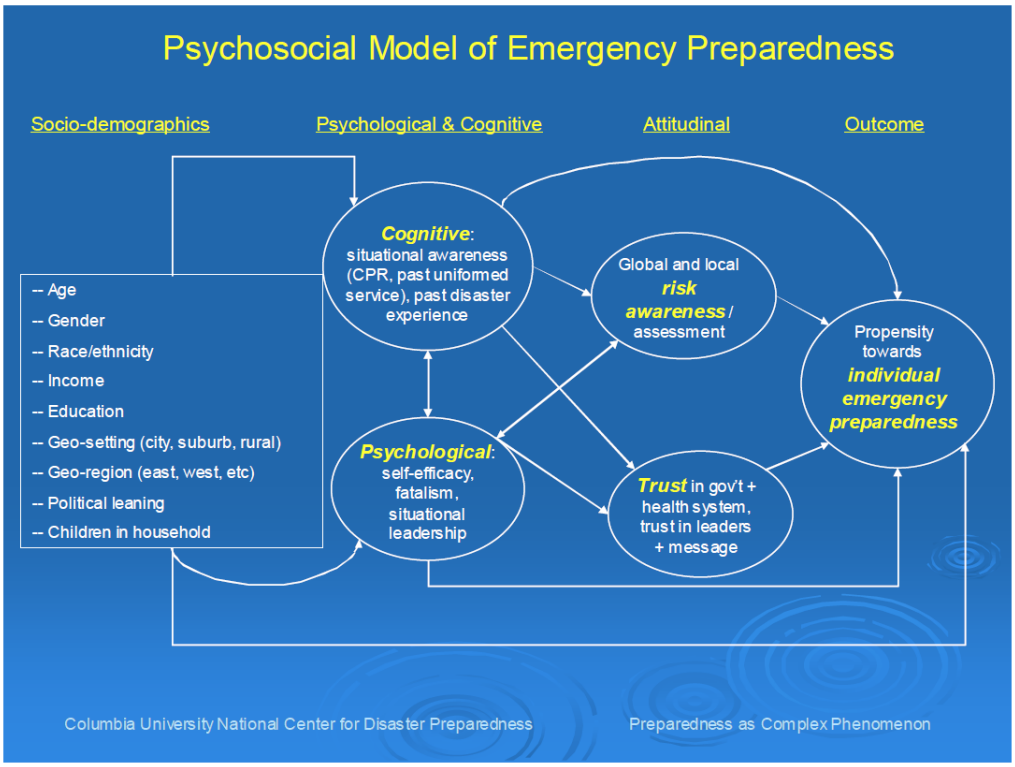

Figure 2.2. Abramson's Psychosocial Model of Emergency Preparedness

Overview of RP Theory

Preparedness research shows that people and organizations do not act to prepare without a sense of being threatened (Paton & Johnston, 2001; Paton, Smith, & Violanti, 2000; Slovic, 2000a). People have to be aware of possible adverse outcomes before they take action to respond to a threat (Burns & Slovic, 2012; Paton, 2003; Paton & Johnston, 2001; Slovic, 2000a). This phenomenon has been the concern of risk theorists and preparedness experts for more than half a century (Boholm, 1998; Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Fox-Glassman & Weber, 2016; Raine, 1995; Slovic, 2000a). Experts from diverse disciplines, including

engineering, political science, nursing, and business, continue investigating how people understand and respond to potential threats (Fox-Glassman & Weber, 2016; Slovic, 2000).

This section presents an overview of existing RP theory in the context of disaster risk mitigation. The perception of risk is described as part of a process that motivates people and organizations to take steps that minimize threats and prepare communities to respond to disasters; literature from several disciplines is explored. The aim is not to provide an exhaustive catalog of the published work but to offer an overview of the viewpoints on RP from multiple disciplines. Research articles are included based on their contribution to a set of thematic concerns and areas of focus across fields. Selected articles include research, organization reports, and unpublished doctoral dissertations. The selection process involved systematized searches of several databases followed by ongoing methodical analysis of the reference sections of the articles.

A thorough examination of the references from identified articles allowed the researcher to formulate new searches and trace relevant sources in an ongoing process. PubMed, EBSCOhost (Academic Search Complete, CINAHL, Health Source: Nursing/Academic Edition, MEDLINE) online, and publisher specific databases were accessed. The author also reviewed several articles that were serendipitously discovered or provided by peers and colleagues. Peer reviewed literature published in English served as the primary source.

Vulnerability

Vulnerability is a measure of an individual's or community's potential for suffering the consequences of an event (Jóhannesdóttir & Gísladóttir, 2010; Landesman, 2011; Paton & Johnston, 2001; Paton, Smith, & Violanti, 2000). Vulnerability involves identifying what is at

risk and who will suffer. Vulnerable groups frequently share demographic similarities including age, sex, ethnicity, minority status, education, and socioeconomic status (FitzGerald et al., 2017; Landesman, 2011; Paton & Johnston, 2001).

Another indicator of vulnerability involves environmental characteristics, such as proximity to hazards and the lack of sufficient protective mechanisms (Arias et al., 2017; Dalisay & De Guzman, 2016; Gotham Kevin et al., 2017; Jóhannesdóttir & Gísladóttir, 2010; Paton, Smith, & Violanti, 2000). Further, temporal issues of an event and the time available to plan and respond influence vulnerability (Landesman, 2011; Ostadtaghizadeh, Ardalan, Paton, Jabbari, & Khankeh, 2015). Slow-acting threats may afford more time to react and change the degree of vulnerability in an at-risk community (Jóhannesdóttir, & Gísladóttir, 2010; Landesman, 2011).

Paton, Smith, and Violanti (2000) explored the association between vulnerability and resilience to disasters and suggested a relationship between identifying and understanding vulnerability and taking action. The authors highlighted the complexity of the interaction between factors that create vulnerability and the response of individuals and organizations. Figure 2.3 illustrates the relationship between risks and the motivation to take action. The capacity to respond is a principal aspect of vulnerability. Individuals and organizations who feel they can act to reduce perceived threats have the opportunity to alter their vulnerability. Having the capacity to identify threats and the capability to respond strengthens communities and diminishes vulnerability (Hellman, 2015; Jóhannesdóttir, & Gísladóttir, 2010; Paton & Johnston, 2001; Paton, Smith, & Violanti, 2000).

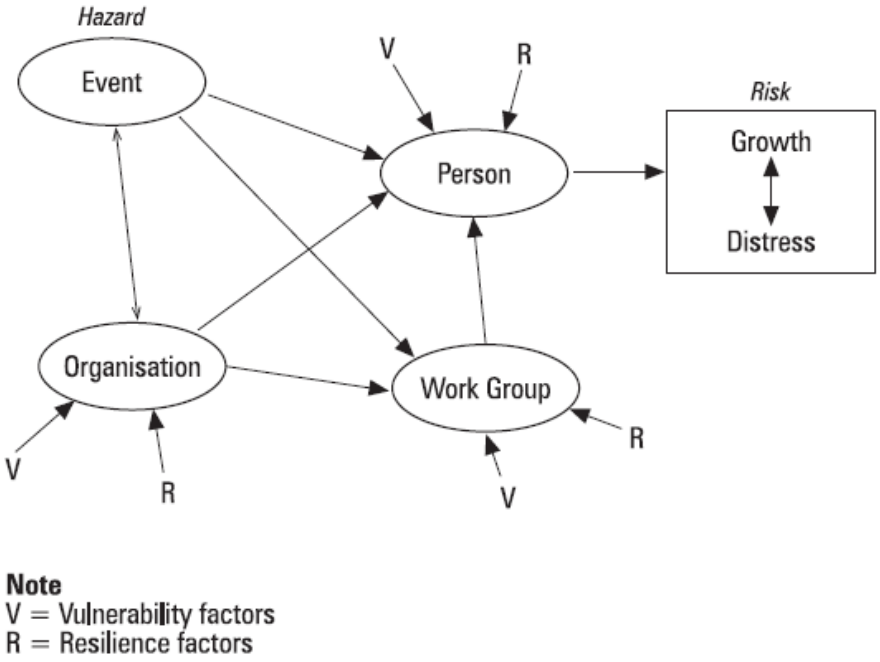

Figure 2.3. Paton's proposed risk management model (Paton et al., 2000).

Preparedness

Preparedness fosters the capacity to respond to sudden or acute needs (Landesman, 2011; Paton, 2003). Preparedness is an ongoing set of interrelated processes aimed at the reduction or elimination of potentially negative consequences from an identified event (Haigh, n.d; Landesman, 2011; Sutton & Tierney, 2006). Preparedness can be understood as a response to recognized vulnerability. Being prepared strengthens individuals and communities, thereby making them more resilient to threats (Duke, 2012; Landesman, 2011; Paton & Johnston, 2001; Ostadtaghizadeh et al., 2015). The preparedness process involves identifying threats, forecasting possible outcomes, and taking precautionary measures to ensure desired outcomes (Christoplos, Mitchell, & Liljelund, 2001; FitzGerald et al., 2017; Landesman, 2011). Examples include:

developing a response plan, acquiring needed equipment, storing supplies, and conducting drills (Duke, 2012; FitzGerald et al., 2017; Landesman, 2011).

Preparedness is not a series of discrete actions. Preparedness activities are interconnected, as are the agencies and individuals tasked with taking steps to prepare (Duke, 2012; Sutton, & Tierney, 2006). Preparedness starts at the individual level and builds to collective action between groups and individuals (Ostadtaghizadeh et al., 2015). Current literature demonstrates that preparedness activities have to address individual needs before individuals can focus their attention on the needs of the organizations and communities to which they belong (Christoplos et al., 2001; Khan et al., 2008; Patterson et al., 2010). Disasters by definition disrupt social and organizational operations; therefore, preparedness efforts should seek to strengthen the connections between groups of people and the systems in which they work (Gowan, Sloan, & Kirk, 2015; Kirschenbaum, 2002; Slepski, 2005; Sutton & Tierney, 2006).

Identifying potential consequences is critical to the preparedness process, regardless of the action an individual or community takes; if such individuals or communities fail to recognize their risk, then no effort to mitigate hazards or prepare for disasters will take place (Abramson, 2003; Burns & Slovic, 2012; Paton, 2003; Paton & Johnston, 2001; Paton, Smith, & Violanti, 2000; Slovic, Fischhoff, & Lichtenstein, 1982). Because RP precedes preparedness, the presence of preparedness measures indicates an awareness of risk and can indicate primary causes for concern (Paton, 2003; Slepski, 2005; Slovic, 2000; Tatsuki, Hayashi, Zoleta-Nantes, Banba, Hasegawa, Tamura, n.d.).

Risk Perception

The literature describes perceived risk as the result of a complex process of decision-making that incorporates the individual's personal view, understanding of available information, cultural context, and trust in authority (Patterson et al., 2010; Rozakis, 2007; Slovic, 2000a). Despite more than 50 years of exploration, experts continue to struggle with understanding how emotional, cultural, and contextual factors contribute to risk-associated decision-making (Burns & Slovic, 2012; Patterson et al., 2010; Slovic, 2000). Patterson, Weil, and Patel (2010) explained that perceived risk consists of two components: an individual's assessment of existing threats and his or her sense of vulnerability. Hazard assessments generally depend on an individual's sense of security based on available resources, such as shelter, distance from threats, and existing protective mechanisms (Paton & Johnston, 2001; Patterson et al., 2010; Slovic, 2000a).

Risk assessment is a broad term used to describe a set of methodological tools employed by the scientific community to assess threats to the public from various hazards (Dawson & Johnson, 2014; Slovic, 2000a; Smerecnik, Mesters, Candel, De Vries, & De Vries, 2012). Despite the capacity to calculate possible dangers, policymakers are often unable to fully communicate the severity of potential consequences to the public (Dawson & Johnson, 2014; Martin, Martin, & Kent, 2009; Slovic, 2000; The psychology of risk perception, 2011). Research shows that the public's perception of risk differs significantly from expert analysis, relying on interpretations formed in the community, intuitive judgment, and personal experience (Gierlach, Belsher, & Beutler, 2010; Hopkins & Warburton, 2015; Slovic, 2000). How the public understands risk and responds to potential dangers is based on contextual factors unique to individuals and communities, often contradicting the opinion and advice of experts (Gierlach,

Belsher, & Beutler, 2010; Hopkins & Warburton, 2015; Usuzawa et al., 2014). Further, a disparity exists between the awareness of hazards and a behavioral change in response to a known threat (Slovik, 2000; Usuzawa et al., 2014). Gierlach, Belsher, and Beutler (2010) explained the relationship between the potential for catastrophe and the capacity to control potentiating factors chiefly determines how people explain their judgment of identified hazards. These issues are largely responsible for the complexity of formulating risk communications and making accurate risk assessment (Dawson & Johnson, 2014; Kellens, Terpstra, & De Maeyer, 2013).

Risk as analysis and risk as feeling. People think of risk primarily in two ways: either emotionally or instinctually or analytically with great thought. Slovic, Finucane, Peters, and MacGregor (2004) proposed that people understand risk emotionally, sensing discomfort and anticipating unwanted consequences and responding intuitively. Slovic et al. (2004) explained that this spontaneous response is an experimental cognitive reaction. The authors described it as fluid and fast, functioning independently of analytical thought. It draws upon readily available images of recent and memorable events (Slovic, Finucane, Peters, & MacGregor, 2004). Slovic et al. (2004) stated that this method provides a sense of what needs to happen immediately in response to pending threats.

Alternatively, the analytical response is slower; it involves weighing all potential outcomes and seeks to understand every possible risk and benefit (Slovic, Finucane, Peters, & MacGregor, 2004; Slovic, Fischhoff, & Lichtenstein, 1982; Slovic & Peters, 2006). This "analytic" or "experimental system" is logical and functions according to formal patterns (Slovic, Finucane, Peters, & MacGregor, 2004, p. 311). Most risk-related decisions are made by

a combination of both systems. Slovic, Finucane, Peters, and MacGregor (2004) stressed that serious inquiry into RP has to consider both methods.

Perceived risk vs. actual risk. Perceived risk involves identifying the threats and hazards individuals or communities believe to be threats (Slovic, 2000a; Slovic, Finucane, Peters, & MacGregor, 2004; Slovic, Fischhoff, & Lichtenstein, 1982; Slovic & Peters, 2006). Perceived risk includes all the hazards about which a community is aware and concerned. Actual risk includes the measured, quantifiable risks that threaten individuals or communities, but the hazards identified as actual risk may or may not be known to the community (Slovic, 2000b). Actual risk is often determined using methods of assessment unavailable to the threatened community, leading to little correlation between perceived and actual risk (Siegrist, 2013; Slovic, 2000b).

Individual factors are increasingly recognized for their role in affecting RP. Individuals can have a differing understanding of hazards based on age, sex, ethnicity, socioeconomic status, health status, as well as previous experience with disasters (Abramson, 2007; Hopkins & Warburton, 2015; Slovic, 2000b; Wernstedt & Murray-Tuite, 2015; Yamamura, 2012). Evidence indicates risk-associated decisions are made based on perceived risk, not actual risk (Slovic, 2000b; Strotmeyer & Lystad, 2017). Decisions are not based on the mathematic, data-driven equations of the organizations tasked with protecting the public; rather, they are derived from local, contextual, subjective assessments (Bradford et al., 2012; Burke, Bethel, & Britt, 2012; Burns & Slovic, 2012; Paton, 2007; Pennings & Grossman, 2008; Smith, 2008; Tran, Takeuchi, & Shaw, 2009; Vastfjall, Peters, & Slovic, 2014). Understanding this process is further complicated because people do not always assign meaning to threats of which they are aware.

Though they recognize the hazard, they might not fear the possible outcome. Both the awareness and concern for outcomes have to be understood to accurately measure perceived risk (Greene et al., 2013; Spiekerman, Kiennberger, Norton, Briones, & Weichselgartner, 2015; Tatsuki et al., n.d.)

Organizations responsible for developing and communicating risk assessments during the pre-disaster phase often fail to incorporate local perceptions of risk when performing risk calculations (Martin, Martin, & Kent, 2009; Usuzawa et al., 2014). Raine (1995) reported a problematic history of organizations communicating risk to a suspicious public. Such difficulties encountered in making the public aware of actual dangers of manmade and natural disasters receives attention from professionals from many disciplines, including sociology, geography, anthropology, political science, and psychology. The literature demonstrates RP studies increasingly focus on the socio-cultural aspects of decision-making and the psychological strategies people utilize when thinking about disasters and pre-disaster decision-making (Dalisay & De Guzman, 2016; Dawson & Johnson, 2014; Grothmann & Reusswig, 2006; Thompson, Garfin, & Silver, 2016; Usuzawa et al., 2014).

Fischhoff et al. (1978) created a psychometric paradigm with the capacity to quantitatively measure perceived risk, supposed benefits, and other aspects of understanding risk. The authors developed a way to map responses to various hazards to determine the level of concern, and the method was expanded nearly a decade later when Slovic (1986) furthered the quantification process involving the scaling of psychological responses. Slovic and others continued to use this “cognitive map” of risk attitude, which allowed researchers to see hazards

ranked hierarchically based on public perception (Burns et al., 1993; Fischhoff et al., 1978; Fox-Glassman & Weber, 2016; Slovic et al., 1982; Slovic & Peters, 2006).

Early efforts to measure public perception of hazards focused on manmade or technological dangers, but few studies examined risk from natural disasters. Much of the early research in the 1970s explored public concerns regarding nuclear power (Raine, 1995). Over time, the focus of RP research evolved to include natural disasters and terrorism (Raine, 1995; Smith, Wasiak, Sen, Archer, & Burkle, 2009). Throughout the field's history, the focus of scholarly works has shifted in reaction to contemporary events. Raine (1995) reported changes in research to natural disasters following hurricanes Hugo (1989) and Andrew (1992). This trend is consistent with the changes in the research focus over time, as well as undergirding response to risk, which tends to shift based on recent events (Mumpower, Shi, Stoutenborough, & Vedlitz, 2013; Slovic, 2000; Smith et al., 2009). Public perception often changes after a disaster; people look to their leaders for help and reassurance that future events will be mitigated (Patterson et al., 2010; Raine; 1995; Trumbo et al., 2016).

Personal Characteristics and Disaster Choices

The literature demonstrates how people determine their level of exposure to natural and manmade hazards and how this directly influences their adaptive behavior (Burns & Slovic, 2012; Fox-Glassman & Weber, 2016; Slovic et al., 2004; Slovic & Peters, 2006). People make decisions about risk based on factors they interpret about events in relation to specific personal characteristics (Burns & Slovic, 2012; Fox-Glassman & Weber, 2016; Slovic et al., 2004; Slovic & Peters, 2006). People analyze various features of disasters, including the damage they believe an event will cause, the number of people they think an event will affect, the threat to future

generations, and the amount of control over the event (Fischhoff et al., 1978; Slovic et al., 2004; Slovic, Fischhoff, & Lichtenstein, 2000a; Slovic & Peters, 2006). Slovic (2000) explained that these characteristics affect people's perceived risk and how they respond to threats.

Current understanding of risk reveals that qualitative risk characteristics correlate to one another; voluntary risks are often perceived as controllable while threats to future generations are considered more dangerous and warrant greater concern (Slovic et al., 2004; Slovic, Fischhoff, & Lichtenstein, 2000a; Slovic & Peters, 2006). Slovic, Fischhoff, and Lichtenstein (2000a) explained the complexity of understanding how people make sense of hazards: "choices are prone to context effects that develop as a result of justification processes, through which deliberates preceding choices are woven into a rationalization of that action" (p. 154).

Research demonstrates how specific personality types respond to hazards and identify risks (Lopez-Vazquez & Marvan, 2003). These identified types typically use the same protective mechanisms to make sense of perceived threats and strategies to justify risk (Slovic, 2000). People use pre- and post-disaster behavior to decrease the stress they experience when thinking about risks.

Bell, Baum, Fisher, and Greene (1984) discussed three of these mechanisms, which they referred to as effects. The crisis effect is the tendency to exaggerate a crisis after a recent event. Concern from the public increases, along with pleas to policymakers to address suddenly perceived concerns (Bell, Baum, Fisher, & Greene, 1984). Though attention will increase for a while, the effects of this response will wane if not repeatedly readdressed. The levee effect describes the tendency of individuals to feel safer in the presence of structural mitigating factors (Bell et al., 1984). The process of normalizing risk—a diminished sense of danger when an

individual or community lives in constant threat or proximity to hazards—is called adaptation effect (Bell et al., 1984; Ho, Shaw, Lin, & Chiu, 2008; Slovic, Fischhoff, & Lichtenstein, 2000b).

Communities constantly under threat may become accustomed to the stress, or they may adapt to their environment by taking steps to mitigate hazards, thus increasing their sense of safety. These efforts are often based on the psychological need to feel as though something has been done and to make sense of unpredictable catastrophic possibilities (Raine, 1995; Slovic, Fischhoff, & Lichtenstein, 1982).

Personal bias. Risk perception can be limited or exaggerated by several known biases that prevent people from correctly understanding their actual risk exposure. The subject of bound rationality has been a concern in the understanding of risk for more than 40 years; individuals make choices based on the number of alternatives defined by their conception of obtainable options (Raine, 1995; Slovic, 2000b). This issue undergirds the difficulty of institutions acting on behalf of the public (i.e., policymakers, legislators, public health educators). Risk perception remains contextually bound, determined more by local experience and socio-cultural issues than professionally developed risk mitigation efforts (Fraser-Mackenzie, Sung, & Johnson, 2014; Gierlach et al., 2010; Raine, 1995). The challenge faced by decision-makers working to protect the public involves protecting them from their limited point of view (Slovic, Fischhoff, & Lichtenstein, 2000c).

Affect heuristic. As previously stated, people make decisions based on contextually influenced judgments. A person's mood is likely to shape his or her reaction to information, perception of risk, and day-to-day choices (Siegrist & Sutterlin, 2014). The presence of the affect

heuristic demonstrates the complex and often unscientific way people make decisions (Slovic, & Peters, 2006; Slovic et al., 2004; Vastfjall, Peters, & Slovic, 2014). Slovic, Fischhoff, and Lichtenstein (2000a) stated, “even when all factors are known and made explicit, subtle aspects of problem formulation, acting in combination with intellectual predispositions and limitations, affect the balance that we strike among them” (p. 165).

Community context. Community grounded issues are central to understanding RP because of the role they play in perceiving threats and determining possible responses to danger (Abramson, 2007; Dalisay, & De Guzman, 2016; Wachinger, Renn, Begg, & Kuhlicke, 2013). Current understanding of culture’s central role in how communities plan illustrates the need to incorporate culture in assessing RP from beginning to end (Dalisay, & De Guzman, 2016; Gierlach et al., 2010; Masuda, & Garvin, 2006). Formal risk assessment methodologies typically fail to recognize contextually bound local constructs of risk. Despite evidence demonstrating that risk and the response to perceived danger is dependent on socio-cultural and location bound dynamics, professionally initiated risk assessments often fail to capture the concerns of the people at risk (Burns & Slovic, 2012; Dalisay & De Guzman, 2016; Spiekermann, Kienberger, Norton, Briones, & Weichselgartner, 2015; Usuzawa et al., 2014; Xu, Zhang, Liu, & Xue, 2014).

Research shows the public is often suspicious of risk communication, ignoring it or misinterpreting it either deliberately or as a result of psychological defense mechanisms and shared community response. Despite the causative factor, the result is diminished faith in institutions and a public that remains threatened (Bradford et al., 2012; Slovic, 2000; Spiekermann et al., 2015; Wachinger et al., 2013). Bradford et al. (2012), in their study of flood risk management, stressed the need for determining how the public understand risk and

characterize it amongst themselves. Bradford et al. (2012) suggested that definitions should come from communities in order to improve communication and participation.

Community-bound social systems function as the framework in which risks are perceived, evaluated, and responded (Dalisay & De Guzman, 2016; Slovic, 2000). Community forms the lens through which people see hazards, assign risk, and conceptualize an appropriate response (Dalisay & De Guzman, 2016; Gierlach, Belsher, & Beutler, 2010; Jones et al., 2013). Communities that foster increased RP and offer many choices to mitigate risk or respond during a crisis tend to have well-developed social networks built on strong community relationships (Greene et al., 2014; Paton, 2007; Paton & Johnston, 2001). Relationships are imperative in the process of evaluating risk, as community cohesion can either strengthen individuals or put them at greater risk. The literature demonstrates the importance of understanding RP in a contextualized way that places culture in a central role.

Gaps in the Literature

Despite ongoing efforts to comprehend RP, many experts recognize a failure to understand what the public fears and how they decide to take action (Spiekerman et al., 2015; Usuzawa et al. (2014). The literature reveals a lack of understanding at the local level where meaning is assigned and decisions to act take place (Dalisay & De Guzman, 2016; Burningham, Fielding, & Thrush, 2008; Hopkins & Warburton, 2015; Paton et al., 2010). As such, further appreciation of how community-contextualized cultural factors influence RP would provide essential information (Geirlach et al., 2010). Developing risk communication and mitigation strategies based on community construction of RP is a priority identified by many researchers

who feel their work only highlights the need for further study (Spiekerman et al., 2015; Paton, 2007; Pearce, 2003; Usuzawa et al., 2014). Speikerman et al. (2015) stated:

> The (research) gap between knowledge of risk, its interpretation and action [8] allows us to re-confirm that a lack of knowledge is not the key challenge. The issue related to increasing disaster losses lies much more with risk interpretation and understanding, mentalities across scales, power structures, personal attitudes, values, world views and budget constraints. (p. 107)

The authors called for greater publicly-driven understanding of RP, a process that gives voice to the concerns of threatened communities. They challenged policy makers to question the "knowledge production process" and seek increased inclusion of those stakeholders who are most at risk (p. 107).

Further studies would contribute to a better interpretation of RP, the function of community participation in understanding risk, and the decision to take action in response to hazards. Slovic et al., (2004) sought to identify the relationship between emotional and analytical interpretation of hazards. Burns and Slovic (2012) proposed an increased focus on risk communications based on the processes people use in deciding how to prepare for crisis. The authors suggested that tailoring messages to community learning styles, cultural identity, and demographic characteristics would improve participation in identified populations. They suggested identifying what people do to prepare and for what they believe they need to prepare.

Despite significant research supporting the need to understand the role community dynamics play in understanding risk, there is little research focused specifically on Native Hawaiians (Crabtree & Braun, 2015; Cutter et al., 2003; Johnson, 2004; Paton et al., 2010).

What literature is available suggests Native Hawaiians contextualize risk based on community concerns and cultural belief systems; traditional beliefs and social interests supersede objective indicators of potential hazards (Gregg, Houghton, Johnston, Paton, & Swanson, 2004; MacGregor, Finucane, & Gonzales-Caban, 2006; Paton et al., 2010). Gregg, Houghton, Johnston, Paton, and Swanson (2004) found that Hawaiians living on the Island of Hawai‘i believed that the volcano goddess Pele would warn them of an impending volcanic eruption. An effort to increase the base knowledge regarding RP among Native Hawaiians directly responds to the sparsity of existing research. To most effectively ascertain the community's concerns related to natural disasters, this research was conducted using an interactive, community-based methodology that offers participants an opportunity to share their perspectives regarding disaster risk within the community. A better understanding of disaster risk perception among Native Hawaiians will help to better tailor disaster preparedness programs for specific communities.

Research Question

The principal question was: "How do Native Hawaiians living in Papakōlea think about the consequences of natural disasters in their community?" by asking participants, "How do you see yourself or the community at risk from natural disasters". The aim of this research was to explore RP among the community as described by community members.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

This chapter presents the study design, discusses the participating community and population taking part in the study, and provides a description of the research approach. In addition, the author clarifies the role of the researcher, describes the research protocol, explains methodological trustworthiness, and outlines steps taken to ensure ethical and safety responsibilities.

Purpose

The purpose of this study was to explore RP among Native Hawaiians living in the community of Papakōlea on Oʻahu. This study aims to explore RP among residents of the Papakōlea community and investigate how community members view the threat of disasters.

Theoretical Framework

Recognizing the importance of preparedness as a crucial step before a disaster strikes the study is guided by Paton's (2003) Social Cognitive Model of Preparation. Paton's theoretical model illustrates how people reach the conclusion that they need to take action to prepare (Figure 3.1). Paton identified risk perception, critical awareness of hazards, and hazard anxiety as the three motivators for change.

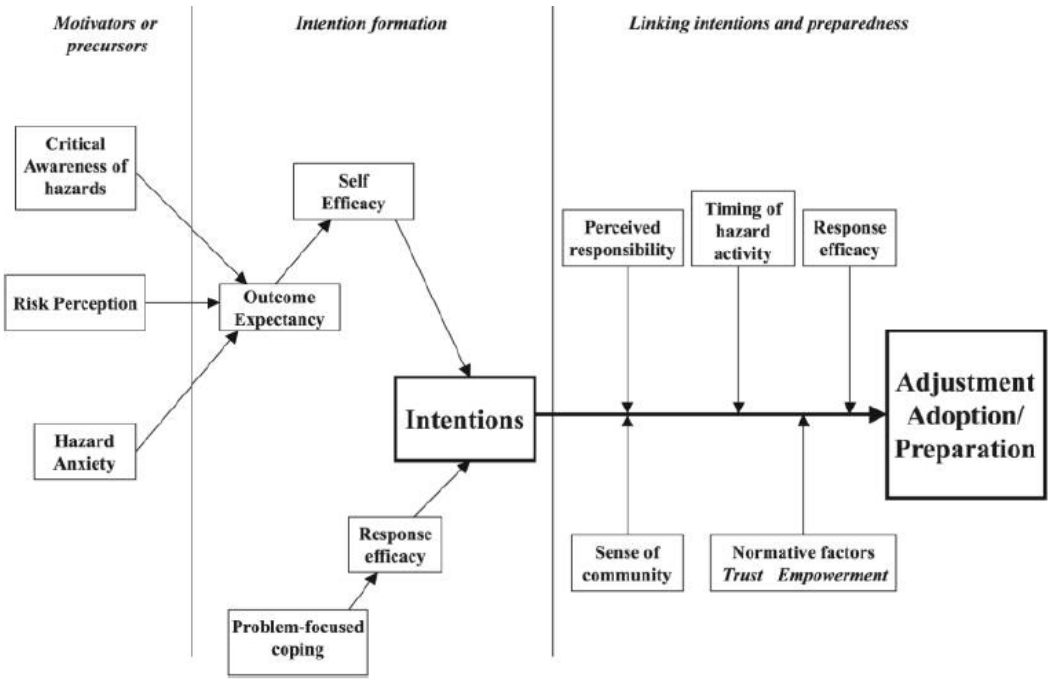

Figure 3.1. Paton's (2003) Social Cognitive Model.

Research Design

Revealing specific contextualized knowledge from multiple points of view necessitates a qualitative method sensitive to nuance (Maxwell, 2013; Mayan, 2009; Minkler & Wallerstein, 2008; Munhall; 2012). This study involved a close relationship between participants and the researcher. It was important that participants felt the relationship was fair, respectful, and equitable; to that aim, the researcher developed a trusting dynamic with members of the community (Minkler & Wallerstein, 2008; Paton, 2007). The research question was addressed by allowing participants to share their perspectives through their own voices using Photovoice (PV) (Maxwell, 2013; Mayan, 2009; Minkler & Wallerstein, 2008; Munhall; 2012).

Methodology background. Photovoice is recognized for its capacity to give voice to the concerns of marginalized communities. Since its inception in the early 1990s, it has been used in

numerous settings to give community members an opportunity to speak their concerns to policymakers in an effort to empower communities to make improvements. Wang and Burris (1994, 1997) explained that PV is a collaborative research methodology rooted in Participatory Action Research (PAR) and Community-Based Participatory Research (CBPR). Photovoice was originally introduced by Wang and Burris as *Photo Novella* in 1994. Since then, the method has grown in popularity, recognized for the reciprocal opportunity it generates between researches and participants. Photovoice is grounded in a mutual relationship between researchers and participants, thereby creating a partnership where "people can identify, represent, and enhance their community" through the use of this method (Wang & Burris, 1997, p. 369). Photovoice fosters community development, building the capacity of individuals and communities to communicate their concerns through the use of photographic images, "by visually amplifying participants' voices around personal and community concerns, experiences, and other matters important to them in order to promote critical dialogue" (Higgins, 2014, p. 211).

Photovoice supports participants because it focuses on the necessity for partnership, creates an opportunity to challenge existing representations of participants, and concludes with an effort to produce policy change through communication with leaders (Wang, 2000; Wang & Burris, 1994, 1997). Higgins (2014) characterized the process as "widening the space for other sorts of counter-narratives" (p. 211). Hergenrather, Rhodes, Cowan, Bardhoshi, and Pula (2009) found that PV facilitates a variety of community-driven goals, addressing both individual health concerns and community improvement.

Wang and Burris (1994) explained that PV is built on three theoretical frameworks: 1) personal/community empowerment, 2) feminist theory, and 3) documentary photography. The

three frameworks undergird the process of generating change in the participating community, but the process begins with self-worth among individual participants. Community members are respected and appreciated for taking part and sharing their voices with the researcher as well as one another. The focus then turns to the community and concerns existing in and to their experiences. Because the data comes directly from the participants, the method significantly increases the opportunity to capture contextual nuance (Kuratani & Lai, 2011; Wang & Burris, 1994, 1997).

Wang (1994) pointed to the educational theory of Paulo Freire and the theory's emphasis on members of a community speaking about their needs and concerns. Photovoice begins this process by teaching participants to share pictures of things that concern them. These images serve as a launching point, from which the group discusses their worries. Participants share images with one another and members of the research team, developing their thoughts and honing the dialogue. This process is consistent with Freire's proposition that building the capacity to discuss their beliefs will improve individuals' self-image and foster a leadership experience (Kuratani & Lai, 2011; Wang & Burris, 1994).

Wang, Burris, and Ping (1996) drew upon feminist theory's emphasis on transforming thought processes and the need to acknowledge the role of women and other marginalized groups of people who are oppressed by socio-cultural paradigms. Feminism's contribution to PV is its focus on the lived experiences of participants as a foundation and starting point for change based on the individual's or group's understanding of their lives (Kuratani & Lai, 2011; Wang & Burris, 1994; Wang, Burris, & Ping 1996). Feminism stresses the notion that change should be

driven from within with respect to the individuals who are asking for change (Campbell & Wasco, 2000).

Finally, documentary photography allows vulnerable populations to express themselves and share their views of the world (Kuratani & Lai, 2011). Images provide a graphic authenticity to participants' lived experiences, thereby facilitating the observer's understanding (Kuratani & Lai, 2011; Wang & Burris, 1994). Photovoice allows participants to speak their concerns and communicate the solutions they feel are vital, thus transforming participants into decision-makers, a role typically held by researchers outside the community (Wang, 1994). Employing PV involves allowing time for participants to discover and become comfortable with their role as co-investigators, and as a result, the process may prove challenging for both researchers and community members.

***Photovoice in Native communities*.** An examination of previous PV projects in Native Communities revealed six important themes: (a) the importance of elders, (b) the value of culture, (c) the necessity of land, (d) the significance of relationships, (e) the use of Native language, and (f) the response to Western culture. The first five themes are intricately connected to and through one another, and in part, they collectively generate and fundamentally support participants' sense of identity (Brown, 2016; Castleden et al., 2008; Genuis et al., 2015; Harper et al., 2015; Helm et al., 2015; Holliday, Wynne, Katz, Ford, & Barbosa-Leiker, 2016; Markus, 2012; Moffitt & Vollman, 2009). Across demographic groups and research topics, these five aspects of participants' narratives ground the discussion, often serving as the contextual lens through which participants may describe their answers to various research questions. Culture,

relationships, and the importance of elders were also consistently found throughout the literature, providing essential information to direct the researcher's work.

The need to protect and nurture an opportunity for participants to discuss their point of view from their perspective is imperative (Brown, 2016; Genuis et al., 2015; Helm et al., 2015; Holliday et al., 2016). The researcher recognized the need to foster opportunities to include community elders and build on existing relationships. Additionally, the researcher identified a lack of participation among Native men, as children and women are consistently the primary research participants within previous PV projects. As a result, the researcher took steps to include men in this exploration of RP.

***Photovoice and disaster research*.** The reason for using PV in the community setting is twofold. First, PV has been used in many situations to empower communities but has not been widely used to study community-based disaster preparedness (Crabtree & Braun, 2015). Surveys and interviews have been used to conduct disaster-related qualitative research, but PV has only recently been applied. Using PV may reveal previously undiscovered information. Second, though the participating community would be identified as at-risk by many disaster assessments, the researcher believes there are significant factors contributing to a general sense of resilience in the community (Adams, 2008; Dillard & Kekauoha, 2016; Dückers, Frerks, & Birkmann, 2015; Paton & Johnston, 2001; Paton, Smith, & Violanti, 2000). The use of a qualitative method that encourages ongoing conversation among participants is appropriate for exploring the community's self-perception of risk (Maxwell, 2013; Mayan, 2009; Minkler & Wallerstein, 2008).

A growing body of literature calls attention to the need to nurture trust between communities and professional disaster planners (Cheung, 2018; Morrow, 1999; Paton, 2007; Patterson et al., 2010; Pearce, 2003; Pelling, 2007). As previously explained, disaster risk communication fails to motivate change when people do not trust the entities providing the information. Photovoice methodologically requires and cultivates trust, and it creates opportunities for researchers to form relationships with community members, which may result in encouraging preparedness activities (Minkler, 2004; Minkler & Wallerstein, 2008; Wallerstein & Bernstein, 1994). Photovoice is an optimal choice for doing disaster researcher because of its grounding in CBPR and PAR and how those methods encourage and develop relationships with such communities.

Participants. Participants were recruited from among Native Hawaiians living and working in the community of Papakōlea on the island of Oʻahu. Papakōlea is a Native Hawaiian homestead located in Honolulu (Appendix F). Homestead residents have to meet the requirement of being at least 50% Native Hawaiian blood quantum to qualify for a home on homestead land (DHHL, 2018a). The researcher collaborated with community leaders to determine who best fit the goals and responsibilities of the research. Working with community leaders ensured consistent participation, adherence to the study's design, and representation of the community's perspective (Belone et al., 2016; Castleden, Garvin, & First Nation, 2008; Genuis, Willows, & Jardine, 2015; Minkler & Wallerstein, 2008; Moodie, 2010).

Population and sample. This research relied on input from community members and the definition of community that came from people living in Papakōlea. Guided by the principles of community-based participatory research, participants were asked to identify themselves and

recognize one another as part of the Papakōlea community (Anderson, & McFarlane, 2000; Jewkes & Murcott, 1996; MacQueen et al., 2001; Minkler, 2004; Minkler & Wallerstein, 2008; Wallerstein & Bernstein, 1994). Previously, community leaders have acknowledged individuals who live or work in Papakōlea as members of the community, and they have also identified having family in the geographic setting as a means of community membership (A. Dillard, personal communications, August, 2015, January, 2019).

Inclusion/exclusion criteria. Participants included members of the Papakōlea community who self-identifed as Native Hawaiian and lived or worked in Papakōlea for at least three years. Participants were at least 18 years old, committed to attending the scheduled trainings following research meetings, including the final community presentation. Participants had to speak English to the extent needed for full participation in the project. Exclusion criteria included: a) minors under 18 years old, b) non-Native Hawaiians, and c) anyone not living, working in, or having lived in Papakōlea. Children were excluded because: a) RP is influenced by age b) adults have more control over risk reduction strategies and can make changes to the threats they identify, and c) discussing threats related to disasters may cause anxiety or fear, producing undue stress on young participants.

Sample size. The researcher sought to recruit between 12 and 15 participants, a size that was appropriate to the research question due to the contextual nature of the information and research design (Maxwell, 2013; Mayan, 2009). The researcher recruited sixteen people from three age categories: 18–37, 38–57, and 58 and older. This provided a broad view of RP from a range of adult participants.

Research site. Papakōlea is located within the traditional *mokuoloko* (geographical district) of Kona and within the *ahupua‘a* (political subdivision) of Honolulu. Figure 3.2 depicts Papakōlea’s location between Kupanihi (Pacific Heights), Pūowaina (Punchbowl), Pu‘u `ohi‘a (Tantalus), and Maunalaha (Makiki) (Dillard & Kekauoha, 2016). Historically, the side of Pūowaina Crater facing Papakōlea was used for cultivating ‘*uala* (sweet potato) from the time of Kamehameha through the early 1900s. In the 19th century, the upper slopes were denuded due to deforestation as a result of *‘iliahi* (sandalwood) for firewood (Dillard & Kekauoha, 2016).

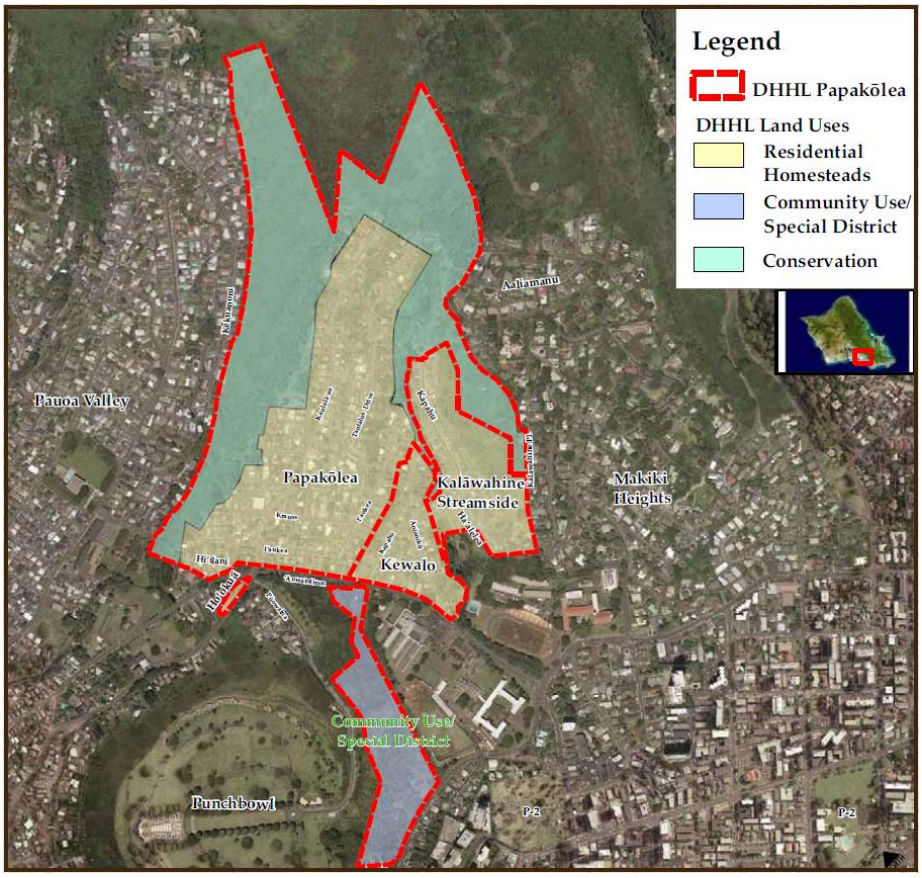

Figure 3.2. Map of the Papakōlea community depicting the neighborhoods, surrounding communities, and Pūowaina (Punchbowl).

Papakōlea consists of 183 acres of land, with a total of 1,795 residents occupying 83 acres of land (Dillard & Kekeauoha, 2016). Built on the steep hillside bases of the Koʻolau Mountains, and the only Native Hawaiian homestead located in downtown Honolulu, Papakōlea is surrounded by a multitude of resources (DHHL, 2009). Nearby, there are fire stations, hospitals, supermarkets, restaurants and schools, though none of the resources are located within the community itself. Papakōlea is comprised of 275 homes, while southeast of Papakōlea, Kewalo includes 60 homes. Kalawahine is the newest addition to the community, located behind Roosevelt High School with 92 homes (Dillard & Kekeauoha, 2016). In total, there are 427 homes and an estimated 1,800-2,000 people residing in the area (Dillard & Kekeauoha, 2016).

The community is divided into separate land-use divisions: 89 acres for homestead, 94 acres of conservation land, and community or special district use (DHHL, 2009). The community use areas include the community center, the homestead entrance sign, and a streamside park. The conservation land is used to protect surrounding resources include ridge tops, watershed protection areas, critical habitats, and can also include sensitive historic and cultural sites (DHHL, 2009).

In 2014, DHHL sought to increase the amount of available residential homestead land in Papakōlea by 20 acres (DHHL, 2009). This was an effort to meet the needs of the Native Hawaiians desiring to be closer to the Central Business District of Honolulu. During these proposals, many geographical issues were identified; for example, steep slopes were recognized as poorly suited for further construction, the potential for rock falls was noticed, and flood zones were observed. These hazards attributed to the many uninhabited homes found today.

Community partnership. The researcher partnered with Kula No Na Po‘e Hawai‘i (KNNPH), a 501(c)3 non-profit organization that provides educational activities for the Papakōlea, Kewalo, and Kalawahine Streamside communities (Kula No Na Poe Hawai‘i, 2017). Kula No Na Poe Hawai‘i (KNNPH) was formed in 1992 by a group of concerned community women who wanted to strengthen educational capacity among area children. Since its inception, the goals of KNNPH have expanded to include health literacy as well as educational training. KNNPH’s efforts include “wellness clinics, education and social programs for youth, nutrition, exercise, traditional Hawaiian healing classes, literacy fairs, and family strengthening workshops” (KNNPH, 2017). The staff of KNNHP is composed of residents and long-time participants from the Papakōlea.

As previously stated, the researcher formed a relationship with the members of the community over a period of time when he brought nursing students into the community to work on community-based health initiatives. This research opportunity stems from several years of community involvement. Further, the researcher is himself Native Hawaiian and shares cultural characteristics of the community.

Sampling. A purposive sampling approach was employed and participants were selected in collaboration with KNNPH (Maxwell, 2013; Mayan, 2009; Munhall, 2012). Mayan (2009) explained that the aim of qualitative inquiry is an in-depth understanding of events from the perspective of people who live the experience in question. As such, it was imperative to this study that participants had firsthand experience in the community. Participants were intentionally selected based on their representation of their community (Mayan, 2009; Maxwell, 2013; Munhall, 2012).

Recruitment. Recruitment flyers explaining the project and inviting participants to join the study were shared by the community partners KNNPH (Appendix A). The recruitment period continued for three weeks. Because the researcher was not living on O‘ahu, questions about the project were postponed until he arrived and could speak with interested community members face-to-face.

Role of the researcher. It was the researcher’s responsibility to maintain the fidelity of the research method. To guarantee the process was followed, the researcher ensured the study design was congruent with similar studies and followed existing standards for the use of PV in Native communities. The researcher provided information about the study and obtained consent from participants before they took part in the study. The researcher sought appropriate guidance from his faculty advisors, community leadership at KNNPH, and the Institutional Review Board at the University of Hawaii as needed.

The qualitative nature of this project required a trusting relationship with the community based on fairness, respect, and equality. The researcher sought community input throughout the process and shared decision-making, his reactions to the process, and findings in accordance with the standards of qualitative research and the PV method (Maxwell, 2013; Mayan, 2009; Minkler & Wallerstein, 2008; Wang, 1999; Wang & Burris, 1994; Wang & Burris, 1997). Throughout the study, the researcher remained open and responsive to participants in an effort to establish and maintain trustworthiness (Maxwell, 2013; Mayan, 2009; Minkler & Wallerstein, 2008).

Insider/outsider role. The researcher is himself Native Hawaiian and was a resident of O‘ahu for more than 20 years. These factors potentially offed insight into the perspective of the

community. Being Hawaiian, the researcher shares many of the same beliefs and attitudes as the participants. The importance of *ʻohana* [family], the value of the *ʻāina* [land] as a source of identity and personal strength, and the need to work cooperatively with the broader community (*laulima*) are values relevant to the researcher. Seeking permission from and showing respect to elders *kūpuna* [elders], sharing what one has, and offering help to people in need are also crucial behavioral traits the researcher feels exemplify Hawaiian cultural expression. These ideas typify the Hawaiian worldview, and the researcher has recognized their expression in the community (Kanahele, 1992; McDermott & Andrade, 2011).

Sharing these beliefs affords the researcher an insider perspective. He anticipated that the participants would express these shared values and appreciate their importance. Further, the researcher understands the difficult task of explaining these ideas in words and can relate to the challenge of sharing them with others. For Hawaiians, many of the fundamental notions of behavior and cultural identity are expressed in action through ongoing relationships (Kanahele, 1992; McCubbin et al., 2013; McCubbin & Marsella, 2009; McDermott & Andrade, 2011). The researcher expected that participants would not have had to describe these ideas verbally and may have used Hawaiian words to explain themselves. The researcher himself feels words like *kuleana* [responsibility], *pono* [correct behavior], *haʻaheo* [pride], *ʻohana*, *haʻahaʻa* [humility], and *ʻāina* express a sincerely held significance when used by Hawaiians explaining their relationship to other people, their responsibility to the land, and the choices they make in relation to their family and the broader community.

Despite this perspective, the researcher also recognized he is not a resident of Papakōlea. Though he lived on Oʻahu, he did not live in or near Papakōlea. He does not have a familial

connection to the land or the community at large. He does not know the physical space or the community dynamics the way participants do. He has a connection with members of Kula No Na Poe Hawai‘i, but it would be presumptuous to assume a connection to the community as a whole. For these reasons, he recognized himself as an outsider who can only guess at the depth of the community bonds, the nuance of various relationships, and the many details of the physical environment.

These opposing viewpoints highlight the notion of insider/outsider as dichotomous positions (Dwyer & Buckle, 2009; Greene, 2014). The researcher is both an insider and an outsider who had to remain aware of, and responsive to, his assumptions and point of view. It was the researcher's responsibility to recognize when the community allowed him an opportunity to participate with them as an insider, and at the same time, ask for clarification and permission as a guest (Dwyer & Buckle, 2009; Greene, 2014; Lincoln & Guba, 1985). The notion of social relationships framed this opportunity to act as an insider and an outsider. The expressed role of the researcher in the socially defined space among the participants represented an overlap of Hawaiian worldview and qualitative research. The community and the participants socially defined both the space in which the researcher worked and his role as the researcher (Greene, 2014; Higgins, 2014, 2016). This understanding guided the researcher through the process. He used a journal and digitally recorded notes to keep track of his feelings about, and response to, the experience. He shared his experience with community leaders and participants throughout the process and sought guidance and opportunities to debrief with his faculty committee members as needed (Greene, 2014).

Operational definitions. The primary definitions of concern for this research included: a) risk, b) disaster, and c) community. Risk suggests a state of being threatened by an unfavorable or undesired outcome (Slovic, 2000). Further, risk proposes unwanted consequences of the result of an action or lack of action (Slovic, 2000). Disaster, for the purpose of this research, was defined as an event that causes significant damage to people or things to the extent that people are injured or structures are made useless as an outcome (Landesman, 2011). As previously stated, the meaning of community is complex and situational. Following community-based qualitative methodologies, the researcher asked the participants to define their community and who they recognized as community members (Castleden et al., 2008; Mayan, 2009; Minkler & Wallerstein, 2008; Munhall, 2012; Wallerstein & Duran, 2010; Wang, 1999).

Instruments. The instruments used for this research were the cameras participants received, the photos they presented, and the descriptions they provided during the photo review/analysis sessions. The researcher audio recorded the sessions for clarification purposes and used field notes to document details of the review/analysis meetings. Demographic data was recorded at the beginning of the study (Appendix B). The in-depth conversations with participants about their photos served to increase clarity and accuracy of the participants' meaning and intentions.

Data collection. Photographs are the foundation of PV and served as a central component of the study (Mayan, 2009; Minkler & Wallerstein, 2008; Munhall, 2012; Wang, 1999). Participants were asked to use only the camera provided by the researcher and were asked not to take pictures using their personal cameras or phones.

As part of the PV process, participants were shown how to use their cameras when they received them (Appendixes C, D, & E). They were instructed in photographic techniques, ethical issues related to photography, and asked not to take images of personally identifiable details, such as faces, addresses, or homes (Appendix D). Participants were asked to take photos of objects and settings in the community that communicated their responses to the research question. Each participant was asked to share no more than 10 photos.

Participants were divided into three cohorts based on their age; 18–37, 38–57, and older than 57. It was anticipated that participants of different ages would have substantially different experiences with disasters, and therefore, different perceptions of risk. Further, the researcher expected cultural aspects among Hawaiians related to age which would affect interactions in mixed age groups. For this reason the cohorts discussed their images separately before meeting as collectively during the final session.

Description of the procedures. Adhering to predetermined procedures strengthens trustworthiness (Cope, 2014; Mayan, 2009). The PV method follows an outline involving recruitment, training, taking pictures, discussing the images/creating a narrative, and presenting the pictures to appropriate stakeholders. Appendices C, D, E, and F outline this process (Belone et al., 2016; Minkler & Wallerstein, 2008; Wang, 1999; Wang, Yi, Tao, & Carovano, 1998). The researcher used two methods to help participants explore and analyze the images they produced. The SHOWeD method (Minkler & Wallerstein, 2008) asks: a) What do you **S**ee here, b) What's really **H**appening, c) How does this relate to **O**ur lives, d) **W**hy does this problem/concern/strength **e**xist, e) What can be **D**one about it. The researcher also facilitated discussions guided by a modified version of Labonte, Feather, and Hills' (1999) story dialogue

method to ask: a) WHAT do you see happening here (description), b) WHY do you think it happened (explanation), c) SO WHAT does this tell us about the factors affecting us (synthesis), and d) NOW WHAT can we do about it (action).

After taking pictures, participants shared their photographs at successive sessions, which provide an opportunity to explore how the question was answered through the meaning(s) of the images. All photos were collected on a single dedicated laptop and backed up on an external flash drive. Photographs were shared within the group of participants and discussed to determine which images best represent the community's perspective. As the group selected images, photos not chosen were moved into a separate electronic folder. At the conclusion of the project, these images were deleted.

The researcher audio recorded the review/analysis sessions to use for clarification throughout the research process, and these recordings were stored on a dedicated digital recording device before being transferred to a laptop then finally backed up onto a password-protected flash drive until the research concluded. Recordings were shared with participants at their request. Demographic information was documented at the beginning of the research and converted to an electronic format (Appendix B).

Photo review sessions. Data was collected over a three-week period in January of 2019. Participants gathered three times. At the first meeting they were introduced to the researcher and the study was explained in detail. Following the consent process the group received their cameras and were instructed on how to use them. They were asked to take pictures of things they felt answered the research question, "How do you see yourself or the community at risk from

natural disasters". Minimal instruction regarding what constituted an answer to the question was given in an effort to reduce the researcher's influence on the participants' answers.

Participants were divided into age cohorts, meeting separately with the researcher to present and discuss their photos. All participants met a final time as a whole group to share the results of the small-group meetings and to decide as a collective which images best answered the research question. A semi-structured approach was unitized at the meetings. Each participant was asked to share ten images and was asked to discuss their photos as previously described.

Pictures were displayed one at a time using a projector and a large screen allowing for the images to be shown for everyone to review simultaneously. The participant who took the image was asked 1) what they meant to capture in the image, 2) what the image meant to them, 3) how did the image answer research question, and 4) how the community might respond to the subject identified. Consistently participants asked for feedback from other participants of the project when asking what could be done about an issue identified in an image.

Before meetings. All meetings were guided by an outline of what needed to be asked. Question prompts were reviewed before meetings and available for review during the photo-review sessions. Participants were reminded that the session would be recorded and the researcher might take notes. The researcher explained the process to the participants, reminded them that they were welcome to review the recordings and field notes at any time, and provided them an opportunity to ask questions. A sign-in record was kept and the researcher made a separate record of who attended in his field notes.

During meetings. Images were displayed one at a time on a screen using a projector that allowed each photo to be enlarged more than three feet across. Participants were asked about

each image using a modified version of the SHOWeD mnemonic previously described. When participants shared the last of their photos they were asked to pick one that best answered the research question and explain to the group why they chose that image. Selected images were later shared with the entire group.

The researcher kept field notes in a journal and explained to the group what he was writing as he made notes. Most field notes recorded when something interesting was said, referenced a specific image, suggested a reason to revisit a photo, or made note of gestures or interactions not captured by the visual recording. Before ending a meeting, the researcher would ask for clarification or further detail on an issue if he had questions and invited participants to for last-minute input.

After meetings. The researcher informed the group when he stopped recording. The researcher would reiterate to the group that they could review the recording and field notes at any time. When questions or thoughts about images came up after recording they were recorded in the field notes. The researcher would remind participants about the next meeting, thank everyone, and provide a $5 gift card for participating. The researcher asked questions of the community leaders regarding scheduling and logistics almost daily. He also asked for clarification when he had questions after reviewing the recordings and notes.

Shortly after each meeting the researcher took time to self-reflect and recorded his thoughts on the meeting, reviewed images of interest, and listened to parts of the recording he had questions about. He documented his thoughts and responses to these images and the resulting conversations in his field notes for further review and analysis.

Assurance of trustworthiness. The standards of credibility, transferability, dependability, and confirmability are the criteria that ensure the rigor of qualitative inquiry (Amankwaa, 2016; Mayan, 2009; Tobin & Begley, 2004). This research provided participants with an opportunity to explore their perceptions of risk. Meeting the principles of trustworthiness works to confirm the value of the findings (Amankwaa, 2016; Mayan, 2009; Pandey & Patnaik, 2014; Tobin & Begley, 2004).

Credibility was established through the purposeful recruitment process. Participants were selected based on their experience as members of the community and were identified by community leaders as appropriate participants (Cheung, 2018; Mayan, 2009; Munhall, 2012). This project's procedures and protocols were informed by previous PV projects in partnership with Native communities, RP research, and disaster preparedness literature. The protocols were reviewed by community leaders to ensure the methodology was an appropriate fit for the community (Cheung, 2018; Minkler & Wallerstein, 2008). Preliminary steps in designing this study were discussed with colleagues and other members of the disaster preparedness community for clarification to strengthen credibility. An audit trail was maintained throughout the process to ensure continuity and adherence to the pre-developed procedures (Amankwaa, 2016; Connelly, 2016; Tobin & Begley, 2004). The researcher has over five years of experience working closely in the participating community with the members of KNNPH. This involvement adheres to the notion of prolonged engagement, a technique used to support credibility (Lincoln & Guba, 1985). Photovoice lends itself to the use of triangulation, the use of multiple forms of data collection, to bolster credibility. Both photographs and narration are part of the data used in PV, and because the research is gathered iteratively by multiple participants, triangulation is built into

the methodology (Amankwaa, 2016; Connelly, 2016; Lincoln & Guba, 1985; Morse, 2015). Member checks, or encouraging stakeholders to give feedback throughout the process, is also built into the PV methodology and was used throughout this project (Lincoln & Guba, 1985).

Transferability, or the extent to which results could be applied in another setting, was strengthened by the detail developed in the interviews through follow-up questions and in-depth explanations provided by the participants (Pandey & Patnaik, 2014). Allowing participants to describe their ideas about RP in sufficient detail meets the criteria of thick description, a primary technique for establishing transferability (Lincoln & Guba, 1985; Pandey & Patnaik, 2014). The PV process, due to the ongoing reflection and interaction between members, fosters detailed descriptions and in-depth explanations of participants' findings.

Confirmability, the notion that the findings are not biased and could be repeated in another setting, was more difficult to secure (Amankwaa, 2016; Connelly, 2016). This research is grounded in the notion that RP is contextually dependent and determined through the interaction of many influential factors. To ensure the research was conducted in an orderly and intentional way, the researcher provided a detailed protocol, outline of the participants' responsibilities, and timeline (Appendices C, D, & E). A detailed record of the research process was maintained as well as a journal of the process. These documents allowed for a methodological audit to facilitate the researcher's accurate recollection when writing the results and discussion sections of the final work (Amankwaa, 2016; Lincoln & Guba, 1985).

Dependability, the stability of the data in similar settings, can be achieved if another researcher agrees with the decision making process during the research (Cope, 2014). The

records kept to establish confirmability enable this process and help the research meet this criterion (Amankwaa, 2016; Connelly, 2016; Mayan, 2009).

The concept of authenticity was fundamental to this study. The goal of this research was to express the ideas and concerns of participants accurately (Connelly, 2016; Cope, 2014; Morrow, 2005; Porter, 2007). The researcher made every effort to involve participants throughout the study, thereby adhering to methodological guidelines and ensuring reliable findings that reflect the participants' thoughts.

Finally, the researcher approached the entire project with the intention to strengthen the results by adhering to the concept of reflexivity. One method to ensure reflexivity is to design research that includes multiple investigators (Amankwaa, 2016; Pandey & Patnaik, 2014; Pillow, 2003). Though the researcher was working alone, the project was developed through a continuous process under the guidance of experienced academic researchers. Further, the researcher worked collaboratively with community leaders and participants who were encouraged to provide feedback, take part in the process, and express worries as they arouse. These interactive procedures create opportunities for the researcher to catch inherent bias and flaws that could negatively affect the study (Amankwaa, 2016; Lincoln & Guba, 1985; Morrow, 2005).

Keeping a reflective journal facilitated a reflexive approach; the researcher recorded methodological decisions, documented concerns, and chronicled conversations with his advisors, community partners, and participants. This journal allowed him an opportunity to reflect on the process as it unfolded and was used while writing the results and discussion of the research

findings (Amankwaa, 2016; Lincoln & Guba, 1985; Mitchell, Boettcher-Sheard, Duque, & Lashewicz, 2018; Pandey & Patnaik, 2014).

Data management. Collected data was stored on a dedicated password-protected laptop and flash drive; demographic information and digital images will be destroyed at the conclusion of the dissertation process. Throughout the research, all data remained with the researcher. Cameras were kept in the care of participants during the project.

Analysis. Participants were asked to collaboratively review their photos as they presented them to members of their cohort and again when they met as a whole group. The first step of the analysis phase required participants to select images that best answered the research question. As the group selected images, they directed the course of the discussion and clarified their collective understanding of the issue (Minkler & Wallerstein, 2008; Wang et al. 1998). Some participants has difficulty with the structure of the of the SHOWeD method of photo analysis. In response, the researcher asked participants what they meant the viewer to see, what the photo means in regards to disasters, and what should be done about the issue seen in the image.

The PV method provided opportunities for ongoing data analysis. As participants reviewed and discussed their images, they shared their common understanding and expressed their motivation for taking the photos (Minkler & Wallerstein, 2008; Wang, 1999). When participants were asked to choose one image over others, they were encouraged to explain the choices they made and explore their feelings collaboratively (Minkler & Wallerstein, 2008; Wang, 1999). Other participants were encouraged to ask questions, in this way, the process itself serves as a crucial part of the inquiry process. The researcher facilitated the process by asking for

clarification, pointing out thematic concerns, and reflecting on the findings with the participants. Participants met a total of three times and meetings lasted between one and two hours.

Rationale. Photovoice was explicitly designed to illuminate the views of historically marginalized communities (Wang, 1999). The method of combining photographic images with narrative analysis sessions facilitated the opportunity to understand the view of participants. As previously explained, PV fosters communication and expression as both process and end product. Photovoice research in Native communities builds upon and reinforces existing bonds (Brown, 2016; Genuis et al., 2015; Helm et al., 2015). Finally, a CBPR approach may generate future interest in disaster preparedness activities among the participants.

Human Subjects (Ethical Considerations)

The researcher received Institutional Review Board Approval from the University of Hawai‘i’s Office of Research Compliance. Concerns for privacy and safety were discussed with participants before the start of the project. To minimize psychological risk, the researcher explained: A) participation was 100% voluntary; B) participants were free to leave the study or any part of the study at any time; and C) participants had the right not to answer any question they were uncomfortable with. There was no indication that these issues arose during the study. When the overall subject of disaster preparedness or risks became stressful to one of the participants the group acted to diminish their worries and minimized their anxiety.

Social concerns were mitigated when the researcher explained how to take photos to protect peoples’ privacy. Photos of faces, homes, or other identifiable characteristics were not shared outside of the group and are not included in the findings. The researcher worked in

partnership with KNNPH and communicated with his faculty advisors from whom he received guidance on an ongoing basis.

Timeline

Recruitment took place in December of 2018. The researcher collected data in January of 2019. The researcher, in collaboration with community leaders, finalized the participant list once he has arrived on Oʻahu. The initial training session was conducted within two days of finalizing the list of participants. The photography phase took place over a three week period to accommodate the participants' availability. Participants met to review photos once with their age cohort and again as an entire group (Appendix C, D, & E). The final presentation/intervention phase of the PV process will be determined in the future.

Summary

This chapter explained how PV was used to explore how Native Hawaiians living in the Papakōlea community described their thoughts concerning risk for the consequences of disasters. The researcher has demonstrated how PV was used during the during the inquiry and explained why it is an appropriate method for answering the research question. Further, the author has illustrated the connection between existing theoretical frameworks and this study. In summary, the researcher used PV to explore how community members think about the threat of disasters. He partnered with participants to illuminate their concerns according to the methodological concepts of CBPR and PAR. The results of this work will be discussed in the final chapters of this dissertation.

CHAPTER 4: RESULTS

The aim of this study was to explore disaster risk perception among Native Hawaiians living in Papakōlea. Demographic characteristics of the participants are presented; followed by photos exemplifying their identified themes. Approximately five hours of interviews were analyzed, with 115 photos examined. Themes were reinforced and supported by the narrative analysis and exemplary photos chosen by the participant group.

Sample

Description of participants. The study had sixteen participants, ten women, and six men divided into three age cohorts, 18-37 years-old, 38-57 years old, and 58 and older. A description of the participants' demographic information is in Table 4.1. Demographic details by age cohort are described in Tables 4.2, 4.3, and 4.4. There were two men in each age cohort. The youngest cohort had six participants and five participants in the two older cohorts. Five of the participants do not reside in the community but work there. Three were in the youngest cohort, one in each of the other two cohorts. One participant, in the 58 and older age group, has lived in the community her entire life. All other participants had lived outside of Papakōlea at some point.

Half of the participants (n = 8) said they had experienced a disaster, defined as an event that required assistance from outside the affected community: three in the 18-37 cohort, one in the 38-57 cohort, and four in the 58 and older cohort.

Table 4.1. Demographic characteristics of all participants

	n		n
Gender		**Have you ever experienced a disaster event?**	
Male	6	Yes	8
Female	10	No	7
		No answer	1
Age		**Do you currently live outside of Papakolea, but work in Papakolea?**	
18-37	6	Yes	5
38-57	5	No	10
58 and older	5	No answer	1
Have you ever lived outside Papakolea			
Yes	15		
No	1		

Table 4.2. Characteristics of 18-37 years old cohort

n = 6			
	n		n
Gender		**Have you ever experienced a disaster event?**	
Male	2	Yes	3
Female	4	No	2
		No answer	1
Do you currently live outside of Papakolea, but work in Papakolea?		**Have you ever lived outside Papakolea**	
Yes	3	Yes	6
No	2	No	
No answer	1	No answer	
	Years		
How long have you lived in Papakolea			
Participant 1	4		
Participant 2	8		
Participant 3	30		
Participant 4	n/a		
Participant 5	30		
Participant 6	5		

Table 4.3. Characteristics of 38 - 57 years old cohort

n = 5			
	n		n
Gender		**Have you ever experienced a disaster event?**	
Male	2	Yes	1
Female	3	No	4
		No answer	
Do you currently live outside of Papakolea, but work in Papakolea?		**Have you ever lived outside Papakolea**	
Yes	1	Yes	5
No	4	No	
No answer		No answer	
	Years		
How long have you lived in Papakolea			
Participant 1	53		
Participant 2	40+		
Participant 3	40		
Participant 4	n/a		
Participant 5	40+		

All of the participants met the criteria of living or working in the community. One person explained that she was not Hawaiian, but was invited to participate by other members of the study. She stated she was not “Hawaiian by blood” but was married to a Hawaiian, and “raised Hawaiian kids.” Community leaders, along with several participants, stated that the person was “part of the community,” owing to the person’s experience working in Papakōlea. Her participation is addressed further in the discussion.

Table 4.4. Characteristics of 58 and older cohort

58 and older *n* = 5			
	n		n
Gender		**Have you ever experienced a disaster event?**	
Male	2	Yes	4
Female	3	No	1
		No answer	
Do you currently live outside of Papakolea, but work in Papakolea?		**Have you ever lived outside Papakolea**	
Yes	1	Yes	4
No	4	No	1
No answer		No answer	
	Years		
How long have you lived in Papakolea			
Participant 1	n/a		
Participant 2	61		
Participant 3	18		
Participant 4	62		
Participant 5	40+		

Findings

Twelve of sixteen participants, four in each cohort, presented photos at their review sessions. The remaining four participants did not present images or did not attend their review. Thirty- five photos were reviewed from the youngest age-group cohort and 40 in the oldest group. Participants in the 38-57 cohort brought 61 photos; however, only 40 were evaluated by the group. A total of 115 photos were assessed.

At the end of their cohort review session, each participant selected one photo from the images they presented to represent their concerns best. At the final meeting of all the participants, these images were reviewed, and nine photos were identified to communicate the participants' answers to the research question (Minkler & Wallerstein, 2008; Wang & Burris,

1997). The nine images selected at the last meeting represented five fundamental themes: a) natural conditions and processes; b) moving in and out of the community; c) physical safety; d) threats beyond our control or understanding, and e) responsibility for the family. The first three themes are interconnected; the participants recognized how these issues interrelate and contribute to one another. The fourth theme, related to threats beyond the community's control and outside their immediate reach to affect, change or understand. The concern for all the threats the group identified was driven by a consistent desire, to take care of their families. Finally, the last theme related to family. The researcher recognized community and cultural expressions in the overarching responsibility for family expressed by the participants. Themes are further explored in the discussion.

An unexpected finding. On January 13, 2018, a false emergency alert activated by the Hawai‘i Emergency Management Agency was sent across the state via the Wireless Emergency Alert system and the Emergency Alert System instructing people to seek shelter from an incoming ballistic missile (Jones & Silver, 2019; Murthy et al., 2019; Staff, 2018a, 2018b). Though a cancellation notice was sent shortly after the initial alert, many residents were already taking action and did not receive the crucial update explaining the warning was a mistake. The effects of the false alarm experienced a year earlier were evident in the responses of participants.

This study sought to explore risk perception as a consequence of natural disasters and did not take into account the ongoing stress residents would continue to feel after the events of January 2018. The missile scare was discussed among each of the cohorts and the importance of that day was debated during the final meeting. Some participants felt the false alarm was the most frightening disaster event they had experienced, and it made them think more about

needing to prepare for disasters. They also believed it showed them how difficult it would be to evacuate because traffic would block the roads, and it might be impossible to move everyone in their families. The participants, as a whole, felt the missile alert was an opportunity to think about what could have happened and that it made the need to prepare for future emergencies evident. Despite the intensity of the missile alert event, many members of the group felt recent flooding on O‘ahu was a more significant concern and had done “actual damage.”

Theme #1: Natural Conditions and Processes

Participants in each cohort drew attention to the effects of natural processes they felt created risks in the community. Photos of exposed tree roots, the loss of topsoil, changes in road conditions, dense underbrush and congested easement spaces, and floodplains were presented by each cohort (Figure 4.1). Four of the final nine images the group chose to represent their concerns illustrated issues resulting from natural processes. The photos and the related discussion pointed to erosion, flooding, trees, and underbrush as the participants’ primary concerns.

Figure 4.1. Erosion exposes tree roots making some trees unstable.

Erosion. Erosion was the most discussed issue. Three of the group's final photos depicted erosion as a threat to the community. Participants pointed to road damage, rock falls, and the loss of soil from yards and near houses as major concerns. One participant was particularly anxious about water flowing under the road near his wife's family's house and the changes he witnessed (Figure 4.2). He tried to capture what he described as a "buckle" in the road and stated,

> I was trying to get the buckle…that's my mother in law's car. And it's right next to where she parks all the time . . . I don't know if it'll . . . If we were to slide, I don't know if it'll affect everyone else next to us.

He further described how flooding had resulted in a house collapsing, opening a path for water to flow across other people's property:

> It was a house right across from us. And um, that fell, and then a whole lot of when it started raining because they tore the house down, so the water started flooding out when it was pouring. And coming straight across into our yard, and then it started eating at the dirt.

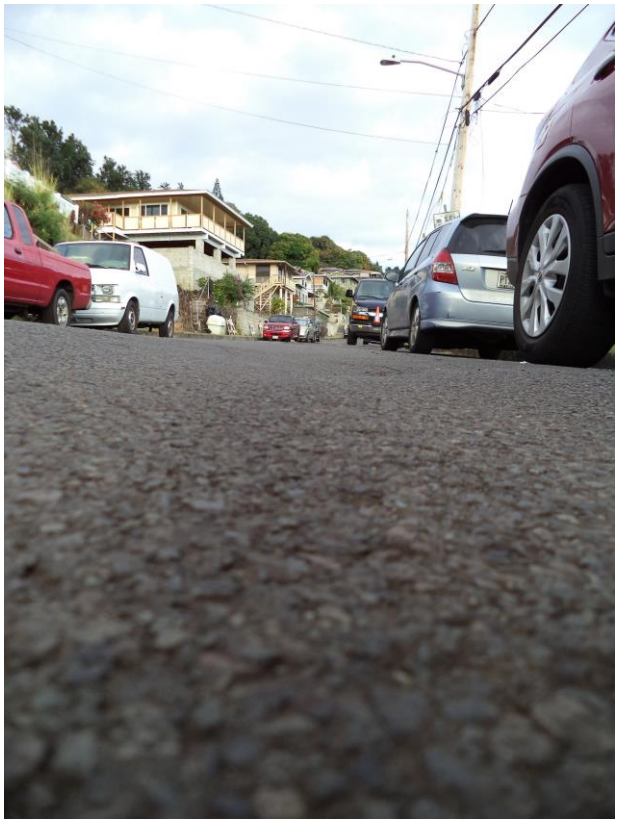

Figure 4.2. Water flowing under the road causes shifting and breaks in the road surface.

Another participant shared an image of a steep incline and described how rocks had continuously fallen from the face of the embankment for many years. He explained how a barrier

had been erected at the base to protect pedestrians. Despite this effort, debris had backfilled the space behind the barrier, allowing rocks to roll over the wall (Figure 4.3). He described how the process continues and is exacerbated during heavy rains:

> . . . after, several years later, the thing starts eroding more. Now it's the, can you see the fencing on our side, same height as the wall? Now the rocks will go over. So, just recently, last year, they put a fence on this whole mountain, so the rocks wouldn't roll.

Figure 4.3. Ongoing erosion causes rocks to fall onto the sidewalk below despite efforts to protect walkway.

His description of the process draws attention to the relationship between erosion and drainage in the neighborhood. The flow of rainwater and seasonal flooding is another major concern.

Flooding. Drainage, rainwater runoff, and streambeds were identified as threats. Blocked culverts and drainage ditches were recognized issues in the community, and in each cohort,

participants mentioned specific locations that became hazardous during heavy rains due to water flowing over the street and sidewalk or across peoples' property (Figure 4.4). A participant in the 58 and older cohort described water flowing over sidewalks and into peoples' homes: "there's no sidewalk, so there's no drainage. So, when it rains, the water comes flooding down . . . into their homes."

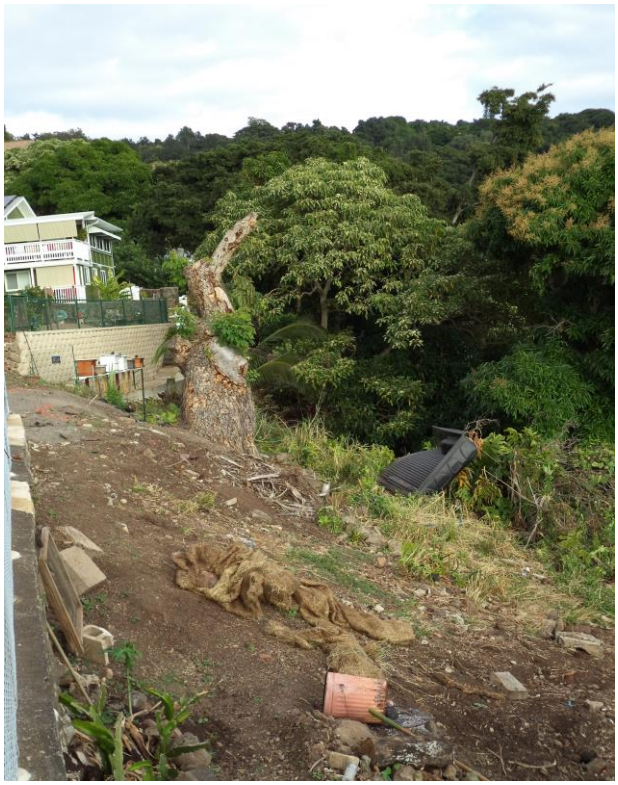

Figure 4.4. Erosion behind a resident's house in proximity to the back of their neighbor's property exacerbated during heavy rains.

Another concern related to flooding was the ongoing maintenance of floodplains and the encroachment of homes onto land known to flood during heavy rains. One participant in the youngest cohort described how she'd sought the help of older residents of the community to

assist her in deciding what to take pictures. She explained that the *kūpuna* she talked to worried that people didn't know what might happen during periods of flooding that happen only rarely. *Kūpuna* who spoke with her told her they had seen past flooding in areas no one cares for now or where houses are being built. She shared the *kūpuna's* concern:

> . . . in this area she said it's never been cleaned, she's been there for twenty, nineteen years she's lived in this area and her concern is that if there's major flooding, the people who live below, or in the area in actual houses will be affected.

Participants felt this knowledge should be considered when new houses are planned and felt bad for new residents who might be affected. They also recognized everyone's responsibility to think about debris and trash that might block drainage ditches. One source of debris familiar to all the participants was waste from trees and undergrowth.

Trees and underbrush. Participants pointed to overgrown trees and underbrush as a threat. They described how uncut foliage blocked roads and walkways, interfered with power lines, clogged drainage ditches and culverts, and contributed to fire risk (Figure 4.5). One participant connected ongoing tree maintenance with the seasonal risk of hurricanes stating,

> . . . the one that usually affects us the most is the hurricanes. So, basically, my pictures are missing, power lines, trees, and flying debris…pretty much that's it...all these power lines they're up close to the trees, and, I don't know, I only talk about pretty much hurricanes 'cause that's the stuff you get affected by the most.

Figure 4.5. Trees grow in close proximity to power lines threatening the safety of residents.

Foliage also blocks sidewalks and stairways and obstructs easements. Participants in the 58 and older cohort described how the easement between properties needed to be clean and clear, and worried that younger residents of the neighborhood had forgotten the responsibility for cleaning the easements. Dead trees and foliage were identified as a fire hazard because they might burn and because they blocked access to homes as well as escape routes (Figure 4.6.). A participant stated when showing an image of an overgrown house:

> Now if this house catches on fire and all of that, how would those people come out? ‘cause they driveway is right down like this, and if you have this huge fire, that fire is gonna be like they cannot even come up through their driveway.

Figure 4.6. An overgrown abandoned house.

Participants recognized erosion and the undergrowth as ongoing processes that contributed to and augmented other risks. Erosion damaged streets, sidewalks, and house foundations, while trees put power lines at risk, and dry undergrowth and vines contributed to fire risk. They understood that during a hurricane or earthquake, these perpetual risks would be of greater concern and might trigger more significant problems.

Theme #2: Moving in and Out Of the Community

Physical access to the community was a concern across each cohort, and participants focused on two issues: the community's dependence on the bridge leading into the neighborhood and the ease of travel on roads and walkways due to abandoned cars. Participants in each cohort spoke at length about the Pūowaina bridge: the bridge that provides access into Papakōlea

(Figure 4.7). They described how continuing work on the bridge made them wonder what would happen if the bridge were to fail, or something caused the bridge to close.

Figure 4.7. Pūowaina bridge. The major source of access into and out of the community.

The condition of the bridge and the ongoing construction were both concerning. Participants considered a range of information about the construction and reasons for the constant renovations. They discussed the possibility that the bridge was being upgraded to facilitate larger vehicles or that some underlying concern had been identified and a current issue needed to be rectified. One participant stated:

> . . . now that there's the construction . . . I mean, just for now, but I don't know how long the construction is going to be there. It's actually made our bridge smaller. Um, but yeah

> when I thought about, you know, disaster, I thought, you know, getting out. So, really, the reality that we only have one road in Papakōlea.

Regardless of the reason for the work, participants recognized their dependence on the bridge and discussed the consequences of the bridge closing. Though there are other routes into and out of the community, they are longer and would increase travel times (Figure 4.8). The group also worried that emergency vehicles would not be able to use the alternate routes because the roads are narrow and there are many turns. Despite their concerns, the participants did not select an image of the bridge as one of their final nine photos. They explained the bridge represented "access" and was related to the issue of moving safely and easily on the streets in the community. One participant, who pointed out the limited access into the community, drew attention to congestion on the streets while sharing an image of cars parked in front of her home:

> That's the only picture I have of my street, but yeah, again, the concern that access, um, I get two cars banging each other on the top of my hill and nobody on my road getting out. So, if the guys on the top panic and block my street, we're done.

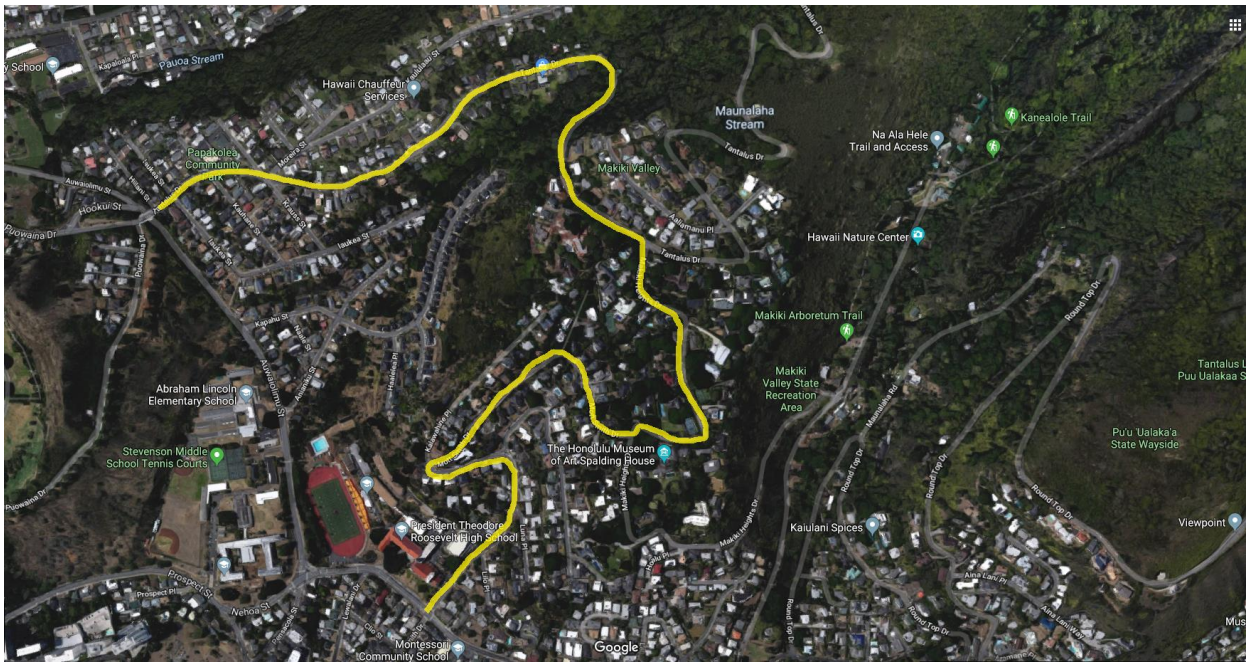

Figure 4.8. Alternate route highlighted in yellow.

Participants described how abandoned cars and the number of cars on the streets make it difficult to get down some of the neighborhood streets (Figure 4.9). Cars were specifically mentioned twice by the youngest cohort, ten times by the 38-57 age cohort, and twice by the oldest cohort. At the final meeting with all participants, cars were mentioned five times. Participants were explicit, in how they described their fears that abandoned cars and congested streets would impede emergency response vehicles and block escape routes if residents needed to evacuate. Participants in the 58 and older age group mentioned access into the community eight times during their meeting.

Discussion surrounding photos of the bridge, abandoned cars, and the condition of the roads centered on an underlying theme of access, which participants explained related to the

more significant issue of safety in the community. Physical safety was commonly identified among the participants' top nine images.

Figure 4.9. An abandoned car.

Theme #3: Physical Safety and Protection

Many photos revealed specific aspects of the built environment and physical space, the Pūowaina bridge construction, congested easements, overgrown yards, flood-prone drainage ditches, the declining condition of houses, the quality of the roads, and an increasing number of abandoned vehicles throughout the neighborhood. Participants in each cohort presented these images and explained that they represented an underlying concern for physical safety. They also shared less obvious photos, providing more abstract ideas about security.

Six of the group's final nine photos displayed aspects of the physical environment. Unanimously, the participants explained that these images represented an underlying concern for physical safety. Participants recognized physical safety as the principle concern during a disaster and understood that if they did not have a safe place to go during an initial event, other measures and planning would not matter.

The group selected two images that were metaphorically about safety and suggested the complexity of the issue in broad terms. A photo of the sky represented the recent missile threat, dollar bills suggested concerns around acquiring basic needs after a disaster, an image of running water, and a closed window. The participants who shared these images took their time to explain their intentions carefully. The participant who presented the image of the window methodically clarified the meaning of the photo to the other participants. The photo shows a closed jalousie window, or louvre window, common in the neighborhood and throughout Hawai‘i (Figure 4.10). She described how she had taken the photo to draw attention to the community's limited capacity to provide safety for themselves. When asked to expand, she explained that physical safety is the most critical concern during a disaster because, "if you're physically safe, then you can figure out the rest of those things." She used Maslow's Hierarchy of Needs to support her notion that safety needed to be secured first so that people lived long enough to worry about food, or money, or taking care of their families.

Figure 4.10. An open window signifying the participant's sense vulnerability.

Building and maintenance. Construction and general upkeep of homes was another safety related concern. There were few images of houses, which is to be expected because participants were asked not to take pictures of peoples' homes, but the condition of homes came up repeatedly in conversation, and the worry posed by abandoned homes, lack of maintenance, construction materials, and failing foundations were shared among all participants. One participant stated,

> So just again, the trees, and the construction, whatever is behind that fence as far as construction materials and stuff. I tried to get a closer look at what was behind there and it's just stuff. It's not tied down or anything, so if there was a hurricane, it could fly into somebody's house across the street or block the road or something.

Another participant summarized this issue when he said,

> . . . a repeating theme was abandoning things. Abandoned cars, abandoned houses, and I would put in that it's not quite abandoned, but things that are unkempt. That was something that a lot of people brought up. You know, the debris fly, in any kind of natural disaster.

Fire hazards. Concern for fires was expressed in each of the cohorts but was most concerning among the 58 and older cohort. Participants described how they felt houses were too close together, where dry trees and vegetation posed a risk, and emergency vehicles would have a difficult time accessing the community due to congested roadways. An image of houses built close together was identified at the final meeting to represent this concern (Figure 4.11). Fire came up in conversation as a constant threat exacerbated by other issues.

Figure 4.11. The proximity of homes to one another was seen as a fire hazard.

Theme #4: Threats Beyond Our Control

Four participants—one in the youngest cohort, two in the middle cohort, and one in the 58 and older cohort—shared pictures of things they felt represented threats beyond their control or outside the influence of the community. The photo of the jalousie window representing safety and another, of water running in a sink, were meant to depict concerns with broad impacts beyond the immediate community resulting from factors outside the participant's control (Figure 4.12). Both images were shared by members of the 38 – 57-year-old cohort and both made it into the whole group's final nine images.

Figure 4.12. A participant shared an image of running water to illustrate residents' dependence on a vulnerable resource.

The participant who shared the image of the faucet said that he was concerned primarily about an attack of some kind, he explained, "if it was to be poison in the water line it could be a disaster. You know, put it in the water system, and then everybody could be whack." When it was pointed out that an attack is an example of a man-made disaster, the group discussed at length the focus of the research question versus the issues they felt concerned about.

The participants agreed they felt threatened by "an attack" or "terrorist stuff" and felt the water represented a weakness they were all dependent on. At the final meeting, participants said the image made them think of the water table, groundwater, and the system of pipes supplying everyone on the island. Participants discussed how the image represented several concerns. First, everyone depends on water and the photo represented a need shared by everyone equally.

Second, the water could become contaminated in many ways including natural disasters. Participants also recognized the delivery system could be disrupted; pipes could be damaged during different types of disasters. During the final meeting, participants felt the image of the water connected to the image of the window, which was described as communicating the underlying need for safety. The participant who shared the image of the window had said during her cohort meeting:

> Um, the jalousies, when we had um, all the talk about the nuclear missiles and they were talking about how to prepare for school and community centers and anybody, that's not going to protect us from anything. From all that fallout that you know you gotta stay inside for 14 days and all that.

To her, the window revealed underlying insecurity shared by everyone. The primary threat she identified was the ballistic missile alarm the residents of O'ahu experienced a year earlier (Staff, 2018a, 2018b). Again, the group discussed whether the topic answered the research question and agreed that they knew they were supposed to address natural disasters but still felt threatened by the recent event, and the image depicted a broader image relating to all disasters, that of safety. At the final meeting, the participant explained, "as much as we're concerned about our food and water and other resources if we had to stay physically safe first. I mean, if we're able to prepare for those things, great, but if we can't even shelter in place," a sentiment agreed upon by the rest of the group.

Another example of threats outside the community's control came from a member of the 58 and older group, who shared images of money and wondered if money would have any value

after a disaster or might represent a vulnerability itself if the economy were to collapse. When explaining an image of money, he stated:

> I may be batting way out field, but the money uh, can be, what is the money worth? Or is the money going to be worth anything? The way things are going now…I mean…all this kind of stuff . . . there's so much debt . . . 2008 everything crashed, and the government bailed . . . but if it happens again, you got all this, we have savings still. We have savings like 401k, pensions, regular savings accounts. If you have cash savings, that's your money. If it's in the bank, I look at it as the bank's money. Um, they're holding it for you, and if anything goes, my feeling, they're going to stop taking money…So how much is the money worth? Do we research it? Do we give ourselves knowledge…you want to keep it in the bank? The banks will hold it for you until they say, well sorry the bank is shut down, you have no money.

One of the fellow participates wondered in response, "that's a good point, I mean when it comes to disaster, I mean should I put away some money and not put it in the bank and keep it just in case something happens?"

Participants wondered if they would need gold or silver during a disaster or if they would have to barter for essentials. These concerns represented abstract threats that are outside the participants' ability to control or influence. This is explored in the discussion.

Theme #5: Responsibility for Family/Children and *Kūpuna*

As expected, all the participants individually, and as a whole, spoke to the responsibility they felt toward their family. No factor motivated the group to participate in the study and respond to one another's findings as much as concern for family members. It was rare that

participants expressed fear for themselves; instead they focused on their children, parents, grandparents or other *keiki* [children/child] or *kūpuna* in the community. When participants mentioned the need to help *keiki* or *kūpuna* other members of the cohort would nod or verbalize their agreement. Family represented complicated issues of strength, motivation, and responsibility. It also represented a difficult to articulate vulnerability.

Despite being asked not to take pictures of people one participant shared three photos of family members, her grandmother, a *keiki*, and her grandfather. When other participants objected, she asked them to hear her argument regarding how important it was to share images of people. She described how family is the most important thing to members of the community. She explained that she was responsible for her grandmother and her children. But family was complicated because of the influence a family member might have on the people around them. She explained that everyone knows at least one person in the family who could stop or change a family's choices and decisions. She shared a photo of her grandfather and said:

> My biggest concern . . . you see how relaxed and calm that individual is? It's because, the morning of the missile, was panicking, like oh, pack it up, load it, move, move, move. And, that is the vision that was sitting in my kitchen, and at the end of everything refused to move. Shut it all down, this man is not moving . . . And it like stopped all our plans, but we had to have a real moment of, you know, well, and then my mom was like 'well, you know, do you go? You and the kids go?' And I'm looking at her like, 'I ain't leaving without you. And I'm not leaving without my grandma.' And my mom is there, 'well I'm not leaving without my dad'. And I said, 'damn, I guess one person decided that we all

> are staying in this house, after spending the last 15 minutes trying to pack up our lives'. I guess one man changed the whole game.

Other participants in her cohort laughed and nodded their heads as she shared the story, and they agreed with the decision to stay and related similar stories. Everyone had experienced a family member with similar influence over their family. They also recognized that abandoning a plan could put the entire family at risk and agreed there was no easy response to the situation. The participant concluded, "So, that's my biggest concern. No matter how much I plan, one man is gonna end it all." Another participant said,

> No, I get that too, because it's like my grandma at home, she's bedridden, she has Alzheimer's, and it's like, okay we're all packing up ready to leave and then it's like okay what about grandma? Oh, somebody must stay behind. Oh no you're not staying behind; we're all going at one time. What about grandma? I don't care put her, drag her into the back of the truck if you have to, we're all getting out of this house together.

At the final meeting, the image of her grandfather was selected as one of the group's choices, and represented a concern shared by all participants. However, the researcher informed the group he could not share the image and would instead share the details of the conversation.

Family was the most significant concern to all the participants. Each of them discussed their responsibility for older and younger members of the community and described how that responsibility motivated them. This was particularly evident among the youngest and middle cohorts who described their developing roles in the community.

Summary

This chapter presented the demographic description of the participants and the results of the PV sessions. Identified themes were illuminated in accordance with the PV methodology. The participants chose nine images to represent their concerns. Collaboratively, the participants and the researcher characterized five crucial themes based on the participants' explanation of their images and the ensuing conversations. The final chapter of this dissertation examines the results in relation to existing risk perception literature and presents the implications and limitations of this study.

CHAPTER 5: DISCUSSION

There has been little exploration of risk perception among Native Hawaiians (Crabtree & Braun, 2015). This chapter presents a close examination of the findings reported in the previous chapter, discusses the connection between three of the themes, and examines the participants' answers to the research question in light of existing risk perception literature. Implications, limitations, and directions for further research are also presented.

This study allowed residents of Papakōlea to describe concerns from their perspective and fostered an opportunity to develop an intervention based on community strengths. Drawing on PV's capacity to capture the lived experience of participants, several issues were identified. The findings reveal a shared experience of living and working in Papakōlea and having formed connections to other community members. This community-focused approach facilitated an open, participatory learning experience for both the researcher and community members. The results illustrate that risk perception is shared and bound to the experience of place.

Participants presented photos that demonstrated an awareness of hazards contextualized in their shared environment. The images draw attention to natural hazards and the built environment. The participants revealed a concern for safety, upkeep, and environmental threats beyond their control. Importantly, the group unanimously agreed that a single photo of a beloved family member represented their most pressing concern, family connections.

Interconnected Hazards

The first three themes, *natural conditions and processes*, *moving in and out of the community*, and *safety of the built environment* are closely connected. These issues contribute to and exacerbate one another. When participants presented an image meant to illustrate one of

these three issues, other members of the group would describe how the image exemplified a related worry. Participants did not change their minds about the images they shared, instead they agreed their photos had multiple meanings and represented more than they originally meant them to.

The first three themes represent tangible objects and conditions in the community; they are neither existential nor abstract and are encountered routinely in the groups' day-to-day lives. Though some of these issues are the results of larger systems, bridge repair or drainage culverts for example, the majority are things the participants felt control over and capable of changing. Participants could clearly articulate how congested roads would impede movement into the community during a disaster and how erosion weakens foundations. They could also delineate a clear timeline regarding the problem, explaining when the issue started and how it had progressed over time.

The group, as a whole, despite being able to explain why these threats were concerning to them and how they might affect the community in terms of a disaster, had difficulty categorizing them. They discussed at length if these issues were the result of human action or natural processes. Further, they debated who was responsible for the threats they recognized; wondering if the onus is with the community or a larger entity, like the City of Honolulu or the State of Hawai‘i. It was difficult to separate these issues from one another, to see where one issue became the other, and to determine which was the impetus for the other.

The participants' awareness of their surroundings and understanding of common threats is consistent with risk perception literature and should be seen as encouraging to disaster planners and emergency managers (Dawson & Johnson, 2014; Pu & Qiu, 2016; Slovic, 2000;

Wiser, Blaikie, Cannon, & Davis, 2004). Participants who live in the community presented photos of the things they saw day-to-day and were intimately acquainted with; it is expected that they would be familiar with their surroundings and aware of small changes (Arias et al., 2017; Mercer, Dominey-Howes, Kelman, & Lloyd, 2007; Mercer, Kelman, Taranis, & Suchet-Pearson, 2010; Slovic, 2000; Wiser et al., 2004). Understanding how these issues are connected and how they may contribute to exacerbating a disaster or pose a danger suggests the participants had an existing awareness of potential threats (Abramson, 2007; Paton, 2003; Paton et al., 2000; Slovic, 2000). The exchange of ideas among the group when discussing the meaning of particular images and the threats the image represented illustrated the shared, community generated aspect of RP (Abramson, 2007; Dalisay & De Guzman, 2016; Kasperson et al., 2000; Paton, 2007; Slovic, 2000).

Community Awareness

Participants across age groups recognized similar concerns in the community and presented similar images. Members in each of the three cohorts discussed similar issues, drew attention to changes over time, and mentioned an increased sense of urgency due to recent events.

When the three cohorts came together for the final meeting, agreement regarding concerns and the threats represented by various photos was quickly established. Though the cohorts had initially met individually to discuss their images, the conversation among the group, as a whole, echoed separate cohort meetings. The literature suggests RP is a result of shared perspectives and collective understanding of things and events (Arias et al., 2017; Kasperson et

al., 2000; Slovic, 2000). The findings of this study support the notion that community members share an understanding of threats in their community and generate a mutual sense of concern.

Consistent with statewide concerns. The dangers recognized by participants in this study reflect ongoing statewide concerns. Considerable effort is put into communicating the primary threats faced by Oʻahu residents, including hurricanes, flooding, tsunamis, and earthquakes (City and County of Honolulu, 2019; Hawaii Emergency Management Agency, 2019; University of Hawaiʻi Hilo, 2019). The participants, across age cohorts, recognized these threats, could describe their potential effects, and identified contributing factors.

This is an encouraging finding, as it suggests that members of this community are aware of the hazards they face and share a sense of understanding regarding potential consequences. This shared perspective is a strong indicator of the community's potential to take steps to prepare for the threats they found and mitigate recognized risks (Abramson, 2007; Paton, 2003; Paton et al., 2000)

Ready to prepare. As expected, individual cohorts and the group as a whole quickly shifted their focus to planning and preparedness (Paton, 2003: Paton et al., 2000). As each cohort shared photos and discussed their concerns, participants began to wonder what they should be doing to prepare for a catastrophe or reduce the risks they identified. This shift from identifying hazards to focusing on preparedness is expected and well documented in both the RP and preparedness literature (Abramson, 2007; Paton, 2003; Paton et al., 2000; Paton et al., 2001; Slovic, 2000a; Slovic, 2000b; Thomas, Leander-Griffith, Harp, & Cioffi, 2015). Paton (2003) argued that three important factors precede the intention to prepare, critical awareness of hazards, risk perception, and hazard anxiety. The in-depth discussions generated during the

photo review sessions exemplified Paton's (2003) three preparedness precursors. Participants acted as their own source of hazard communication drawing one another's attention to the issues they individually recognized, confirming each other's thoughts, and magnifying their collective awareness.

Threats Beyond the Community's Control

An unexpected finding was the concern for issues beyond the community's immediate influence. A ballistic missile strike or terrorist attack were not topics the researcher anticipated. Because PV leaves room for participants to change a project as it evolves, and several people shared the concern, the findings need to be considered and should be addressed when helping the community plan preparedness activities.

The conversations generated by the images of the running water and the window focused on the issue of vulnerability, predominantly from outside threats to city or statewide infrastructure. Community members have no direct influence on the issues they identified, such as foreign relations or the city's water supply systems. The literature shows that people feel more significant anxiety regarding threats that seem lethal and impossible to control (Siegrist & Sutterlin, 2014; Slovic, 2008; Slovic, & Peters, 2006). An appropriate response to this finding is to provide information to the community, which may help them understand the issue and use their concern to motivate steps to prepare using an all-hazards technique (FitzGerald et al., 2017; Landesman, 2011). It may be impossible to entirely alleviate the stress people feel from the hazards they perceive as fatal but taking steps to prepare for a crisis can help people feel more at ease (FitzGerald et al., 2017; Landesman, 2011; Slovic, 2008; Slovic, & Peters, 2006). An all-hazards approach encourages people to prepare in a way that readies them for a spectrum of

events and addresses their needs broadly (CDC, 2013). Participants agreed that their primary concern was the responsibility they felt for their families.

Responsibility for Family

The concern for family produced more worry and fostered more agreement among participants than any other topic. Conversations around family generated laughter, anxiety, and motivation from participants during the cohort meetings and among all of the participants at their final gathering. Each cohort imagined their role slightly different. The two younger groups spoke of their responsibility to their children, parents, and grandparents. The 58 and older group discussed duty to the community as a whole, their extended families, and as community leaders representing the community itself.

The discussion around family demonstrated the closeness of the participants, their familiarity and connection with one another. While considering their feelings about family, participants told stories, laughed, and commiserated with each other. Though most of the dialogue celebrated family members and participants took pride in explaining their sense of responsibility, the thought of their loved ones at risk caused worry and concern. Participants supported one another when their anxieties were revealed and moved the conversation toward preparedness measures and risk reduction.

Participants agreed that their sense of commitment to family members motivated them to prepare and that despite being a challenge, family would also come to their assistance during a crisis. The anticipated needs of family members were not described as a burden; participants never portrayed the care children or *kūpuna* needed as an inconvenience. Instead, they spoke pragmatically about their roles as providers and considered whom they could turn to for further

help. Discussing family revealed the network of comfort and assistance, members of the community provide to one another on an ongoing basis.

The way participants talked about family is essential to disaster planners because it illustrates how participants move from discussing threats to thinking about preparation. The feelings between family members and the sense of responsibility participants feel for one another reveal community-based social connections. Emergency planners can use these networks of support to strengthen the community's efforts to prepare and develop resilience to potential threats (FitzGerald et al., 2017; Landesman, 2011; Slovic, 2008; Slovic, & Peters, 2006). The challenge a single family member, with the influence to upset a household's evacuation plan, poses is also a valuable lesson to planners. All of the participants verbalized understanding of the situation and could imagine a member of their own family doing something similar. Disaster planners have to understand this critical dynamic and work to identify and address it within the communities they serve.

The thoughts and concerns participants felt for their families aligns with current the understanding of RP and the motivation to prepare for potential disasters (Abramson, 2007; Paton, 2003; Slovic, 2008; Slovic, & Peters, 2006). While discussing family, participants revealed what mattered to them most, how they saw themselves as members of their families and the community at large, and the point at which preparedness becomes the goal of a person aware of potential threats.

Findings in Relation to the Literature

The findings of this study support Paton's (2003) Social Cognitive Model, demonstrating the role risk perception plays in motivating people to prepare for disasters. Abramson's (2007)

focus on socio-demographic factors is also reinforced, as age and ethnicity contributed to the way participants perceived threats to the community and influenced their response to those concerns. The findings also suggest that the participants' responses are expressions of whom they see themselves within their community. How they see their surroundings, the way they recognize hazards, and the responsibilities felt in response to vulnerabilities are expressions of who they are as members of the Papakōlea community.

Paton's theory. Paton (2003) challenged the notion that providing the public with information regarding hazards was enough to promote preparation. He suggested a model that incorporated social cognitive variables and health protective behaviors to predict preparedness. The findings of this study support his model and demonstrate that risk perception precedes and drives preparedness choices. Participants were asked to take ten pictures to answer the question, "How do you think about the consequences of natural disasters in the community?" The average number of photos reviewed in each session was less than 40, and the review sessions lasted less than two hours, but in this time, participants described the risks to their community, discussed the most concerning threats, debated contributing factors, identified the most vulnerable community members, and began focusing on reducing risks and preparing for catastrophes.

While the researcher acted only as a facilitator, the participants created a narrative regarding the risks to their community and articulated the meaning of those risks. This phenomenon exemplifies Paton's model which suggested that RP contributes to intention formation and preparation.

Role of the community and community roles. Abramson's (2007) Psychosocial Model of Emergency Preparedness suggests that a multitude of factors contribute to an individual's RP.

Abramson (2007) pointed to factors including age, gender, ethnicity, setting, and the presence of children as important elements that influence how people think about and respond to threats. As stated earlier, his work underscores community context and relationships. The findings of this study support his model.

Participants in the middle cohort recognized their growing responsibility to the community and their future position as *kūpuna*. Participants in each cohort described their responsibility to one another and the community as a whole, supporting the idea that a person's role within a community affects their RP.

Hawaiian culture. The results of this study show how intimate knowledge of place contributes to identifying and describing risks. Participants could explain how threats worsened over time and were exacerbated by contributing factors. Participants also articulated their roles in the community and responsibilities to other community members, their families, and people outside the community. This study does not provide enough information to determine if participants' knowledge of their environment is a result of being Hawaiian or if it comes from living and working in Papakōlea. However, there are several details which suggest Hawaiian cultural expressions contributed to the study's results. The most significant of these was respect for *kūpuna* and concern for *ʻohana* as the primary motivating factor.

The exchange among participants during the photo review sessions may also represent aspects of Hawaiian culture. Sessions were semi-structured and informal, and mirrored the informal *talk*-story (*kūkākūkā*) conversational style prevalent among residents of Hawaiʻi. Talk-story is characterized as, "relaxed, rambling, sometimes intense commentary or conversation" (Ito, 1999). The researcher acted as a facilitator by asking the first few questions about each

image then allowed conversations to develop among the participants. The literature suggests that talk-story facilitates conversations around stressful topics while leveraging and affirming relationships (Affonso, Shibuya, & Frueh, 2007; Ito, 1999; Sripipatana, Pang, Pang, & Briand, 2010).

Other essential aspects of Hawaiian culture evident during this study were the ideas of *laulima* [working together] and *kuleana*. The notion that the community would face a disaster together, that participants were collectively a part of the research process, and that every cohort had a role to play are examples of *laulima*. This sense of participating with and in the group has particular meaning among Hawaiians (Affonso et al., 2007; Ito, 1999). The responsibility to take part, to participate when asked, and to help family and friends is an example of *kuleana* (Affonso et al., 2007).

Hawaiian identity. Inclusion criteria for participation involved identifying as Hawaiian and living or working in the community. One participant, who was asked by community members to participate, was not Hawaiian "by blood" but stated she was married to a Hawaiian man, and "raised Hawaiian children." The participant did not identify as Hawaiian but focused on her ties to Hawaiians, and her identity as a community member, a stance reiterated by other participants. When the researcher approached community leaders about this issue, they explained it is the community's privilege to identify members of the community and restated their support for her participation. The researcher believed it was appropriate to defer to their decision (Minkler & Wallerstien, 2008; Wang& Burris, 1997). Photovoice is grounded in CBPR, which emphasizes the role of participants as equals with the capacity to guide the researcher on their terms.

Using Photovoice to Facilitate Preparedness Measures

The outcomes of this study support PV's recognized capacity to illuminate community-based concerns and participant driven responses. The trust required of CBPR provided an ideal dynamic for the researcher to act as subject matter expert on concerns such as disaster preparedness and risk mitigation. In this case, the researcher was present to facilitate discussions regarding the participants' concerns and provide information about various threats and preparedness measures when the participants asked. This interaction between the participants and the researcher supports the role of the researcher as a participant in change and resource for the community (Minkler & Wallerstien, 2008; Wang& Burris, 1997).

PV lends itself to this process when the researcher is an expert in the subject concerning the community (Minkler & Wallerstien, 2008). In this case, the community was able to ask the researcher questions as their concerns emerged. Further, the participatory action quality of PV ensures an opportunity to develop a response to the community's worries.

Participatory action. The PAR aspect of PV puts the responsibility on the researcher to collaborate with participants to find a solution to the concerns they identified. After the final meeting the group as a whole, including the researcher, discussed an appropriate intervention. At that time two opportunities were discussed. Creating a website to share the findings of this study and a community-wide training event to help Papakōlea community members take steps to prepare.

Implications

Policy. This study demonstrates the need to consider unique factors influencing individual communities. It also suggests there are significant supporting mechanisms present in

communities' that foster resiliency and may help communities mitigate risks and respond to disasters from within. Emergency planners should work to understand the history and cultural dynamics of the communities they serve to capitalize on these features.

The results support Hawai'i's ongoing disaster preparedness efforts, as participants were aware of the threats consistently communicated via ongoing state-wide efforts, though this study did not explore how participants developed their awareness the results align with current risk communication.

Nursing. The implications for nursing are particularly crucial in terms of community preparedness and disaster readiness. As stated previously, nurses are particularly well suited to act as leaders in disaster planning because of their understanding of peoples' needs across the lifespan, familiarity with all aspects of the healthcare system, and their established role in disaster response. Nurses are also skilled in assessment and communication, two of the hallmarks of disaster planning and community-based health endeavors. Nurses are also well suited to take action in the form of policy change, community engagement, and education.

This study revealed several vital opportunities for nurses to engage individuals, communities, and policy makers to increase risk awareness and plan for disasters.

Limitations

This paper has several significant limitations. These weaknesses include issues of the methodology, community dynamics, the researcher, and recent events on O'ahu.

Methodology. Photovoice is a relatively new research method, and its use is varied across research settings, participating communities, and research questions. Photovoice lends itself to CBPR because it is a flexible, easy to use methodology, but it is not without drawbacks.

The results of this study reveal only the perspective of the participants, and there is no way of knowing if their experience echoes that of the entire community. Care needs to be taken when considering how the results may or may not represent the concerns of the community at large (Wilkin & Liamputtong, 2010). Despite efforts to teach participants how to use cameras and capture their ideas in a photo, photography is challenging in terms of both technical know-how and intentional expression. Despite their best efforts, participants may not have captured exactly what they meant to communicate.

PV relies on photographs to answer research questions, limiting the possible answers to what can be viewed and photographed. This acknowledged limitation is countered by the discussion sessions and the researcher's efforts to facilitate conversations that nurture the participants' ability to communicate their perspectives and intentions (Castleden et al., 2008; Minkler & Wallerstein, 2008; Wang & Burris, 1994, 1997). Discussions were intentionally semi-structured to allow participants the opportunity to explore their ideas and respond to feedback from the group to capture their ideas, which may not have been in their photos (Castleden et al., 2008).

PV requires a great deal of time. Participants were asked to attend three meetings, all of which lasted more than an hour. They were also asked to review the researcher's findings as the study progressed. This commitment may have caused some participants to feel imposed on or pressured. Participants may have felt obligated to attend the scheduled meetings and might have wanted to hurry during the photo review process. This could also account for why some participants did not attend all the sessions.

Community dynamics. Participants were chosen with help from community leaders who have ongoing relationships in the community. They facilitated the recruitment process, calling on people with whom they consistently work and whom they felt would finish the project. Existing dynamics may have introduced bias, and participants may have felt obligated to join. Also, because members of the study know one another and will continue to live in the community, they may have felt a social obligation to support one another's perspectives.

Despite literature suggesting that a partnership with community leaders strengthens community-based research, it may also lead to sampling issues. Community members who are not connected to KNNPH may have been unintentionally excluded from the study. The nature of qualitative research limits the transferability of findings and emphasizes specific lived experiences. Though the study can be reproduced in other communities, or with other community members the findings may not reflect other peoples' views.

The nature of this study, its focus on risk and vulnerability, creates a potential situation where participants may place blame or responsibility on another community member. This aspect of PV is well understood and was one of the principal motives for addressing ethical concerns at the beginning of the project.

Another important aspect of this community is the intergenerational relationships among Native Hawaiians. Respect and reverence for elders is an expectation in Hawaiian culture, and younger participants may have deferred to the thoughts and opinions of older community members out of respect (Handy & Pukui, 1972; McCubbin & Marsella, 2009; McDermott & Andrade, 2011). Efforts were made to reduce this from happening by organizing the photo review sessions by age.

The researcher. CBPR requires ongoing collaborative engagement between the researcher and the participants. Though the researcher worked in the community for several years, he had not met all of the participants before conducting this study. The trust and mutual understanding on which CBPR is founded may not have been developed with all of the participants. Further, the study was conducted over 21 days, during which community members could only meet a limited number of times. Further detail and understanding may have been revealed during additional meetings.

Recent events on Oʻahu. There were a number of disaster warnings and localized disasters across the State of Hawaiʻi and Island of Oʻahu in 2018. Flooding caused significant damage on Oʻahu and Kauaʻi, a volcano was erupting on Hawaiʻi Island, and the missile alert caused panic across the state (Big Island Video News, 2019; Drewes, 2018; National Oceanic and Atmospheric Administration, n.d.; Staff, 2018a, 2018b). The researcher was no longer living on Oʻahu and was not aware of how important these events were to the participants.

RP is affected by recent events, and hazards thought to be out of a person's control cause higher anxiety (Siegrist & Sutterlin, 2014; Slovic, 2008; Slovic, & Peters, 2006). A growing body of literature demonstrates that the false alarm caused significant distress to Hawaiʻi residents and may have a lasting effect on some people (Jones & Silver, 2019; Murthy et al., 2019). Perhaps the researcher should have discussed these events with participants at the onset of the study and determined if they wanted to focus on all forms of disasters or man-made disasters specifically.

Recommendations for Future Research

The findings of this study support the value of local knowledge and emphasize the role culture plays in some communities. It also demonstrates the value of exploring risk perception among specific communities to better understand their distinctive needs. Further exploration of RP in specific communities is warranted.

This study supports Paton's (2007) model, illuminating the role RP plays in motivating people to think about disaster preparedness, determining how quickly people decide to prepare would be of value to emergency planners. A follow-up study to ascertain if people took steps to prepare after participating in this study would also be of value.

Participants in the three cohorts articulated their role in the community differently, establishing who can most meaningfully help the community by raising RP and drive preparedness efforts would strengthen the community as whole.

Participants expressed concern for issues beyond their control and outside typical disaster communication efforts currently employed. An exploration of these existential threats and the role they play in motivating people to prepare for more common hazards would help planners develop strategies to minimize unnecessary worry in communities and create plans that focus on recognized concerns.

Conclusion

This study revealed important aspects of RP in the community of Papakōlea. The results support Paton's (2007) model, sustaining the notion that people want to prepare as their RP increases. The participants were aware of the threats typically communicated to Hawai‘i residents and could articulate the relationship between their environment and potential disasters.

Additionally, examining the issue from the perspective of three age-specific cohorts revealed that there are differences in RP and sense of responsibility between age groups.

Members of this community benefit from local knowledge developed over many years and the familiarity older residents have with their environment. The participants of this study demonstrated a strong sense of community commitment and responsibility toward their families, other community members, and the expression of community identity.

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Appendix A

Participant Recruitment Flyer

A Nurse Researcher from The University of Hawai‘i is conducting a study:

How is the Papakōlea Community at Risk for Natural Disasters?

Do you live or work in Kewalo, Kalawahine, or Papakōlea? Do you identify as Native Hawaiian? Are you at least 18 years old?

If the answer is **YES**…

Morgan Torris, RN would like to invite you to participate in a research study.

Purpose:
The purpose of this study is to explore if members of the Papakōlea community feel threatened by natural disasters, and if so, what they think poses a risk.

What you will be asked to do:

- Participate in one training session, two or three project meetings lasting up to two hours, and a final presentation to the community.
- Study volunteers will be compensated for their time.
- A summary of the findings will be available to participants.

To learn more about the study,
Please call Morgan Torris at 808.429.2439

Appendix B

Demographic Information

(1) What is your age group?

18 – 37 _____ 38 – 57 _____ 58 + _____

(2) Gender Male____ Female _____ Transgender _____

(3) Do you live in Papakōlea _____

(3-1) If yes, how long have you lived in Papakōlea _____

(4) Do you work in Papakōlea _____

(5) Have you ever lived outside of Papakōlea _____

(6) Have you ever experienced a disaster event _____

Appendix C

Protocol

- This project will take place in Papakōlea Homestead on the Island of Oʻahu.
- Participants will be recruited through the community partner, Kula No Na Poe Hawaiʻi, using a purposive sampling method. Participants will be asked to sign consent forms and will be given an opportunity to opt out of the project (see proposed timeline, Meeting 1).
- Participants will be shown basic photographic methods, taught to use the cameras, the background of Photovoice will be discussed, and the ethical concerns regarding photography explained to them by the researcher.
- Participants will be asked not to take photos of personal identifiers to include faces, addresses, and community members' homes.
- Participants will be divided into three groups based on their age. Each group will include both men and women.
- Participants will be asked to take pictures of the things in the community that represent their perception of risk for natural disasters.
- Participants will have a day or two based on their time constraints to take photos, and then they will meet collectively with the investigators to discuss their images in the age based groups (Meeting 2).
- Each participant will be asked to share no more than 10 images. Of those, the group as a whole will determine which pictures best answer the research question. This process will be iterative, and will involve at least two photo collection periods.

- The research question will be refined and participants will be asked to take another round of images.
- The investigator will screen the images for identifiable details and exclude those images as needed.
- Images that best describe community concerns will be used to represent specific concerns. Images must be agreed on by the group.
- The meeting will be audio recorded for later review.
- The researcher will review field notes and listen to the recorded sessions for detail and clarity.
- The researcher will make notes in the reflexive journal.
- Between meetings with the community, all data will be kept in a locked container on a password protected flash drive in the presence of the researcher.
- The investigator will make notes and look for thematic responses based on the presented photos, field notes, and recordings of the previous meeting.
- Participants will have another day or two to capture additional photos before a second discussion activity (Meeting 3).
- Each participant will be asked to share no more than 10 images. Of those, the group as a whole will determine which pictures best answer the research question. This process will be iterative, and will involve at least two photo collection periods.
- The investigator will screen the images for identifiable details.
- The researcher will review field notes and listen to the recorded sessions for detail and clarity.

- The investigator will make notes and look for thematic responses based on the presented photos, field notes, and recordings of the previous meeting.
- A third discussion will take place as determined by the participants (possible Meeting 4).
- The final round of photos will be examined and discussed. The “best” images, those which most accurately portray the community’s concerns, will be identified (Meeting 4/5).
- As a group, the researcher and the participants will decide how to communicate the identified concerns to the most appropriate audience (Meeting 4/5).
- Finally, the photos determined to best represent community concerns will be shared with the broader community (Final Meeting).
- All data will be destroyed at the conclusion of the project.

Appendix D

Participant Responsibilities

Responsibility	Researcher	Community leaders	Participants	Community at large
Before: - Researcher - Community leaders - Community at large	- Explore background of issue and share with community leaders - Discuss partnership with existing community program - Create research protocol - Apply for IRB approval - Consider methodological concerns and plan for appropriately - Answer questions as needed, adjust plan accordingly	- Review research proposal in collaboration with researcher - Discuss possible challenges and make suggestions as needed - Facilitate recruitment process	- n/a	- Review recruitment flyers and consider joining project*
During: - Researcher - Community leaders - Participants - Community at large	- Provide PV training (use of cameras and ethical concerns) - Explain research question, methodology, project goals, and ask participants to sign consent forms - Facilitate picture review sessions - Record sessions and maintain field notes	- Provide space and equipment for meetings - Help the project to progress according to the established protocol - Inform the researcher if worries develop - Offer suggestions regarding final presentation	- Attend all meetings as agreed - Sign consent forms if they agree to join the project - Divide into groups based on age - Take part in finalizing the research question - Provide agreed upon number of images at each meeting	- Work with community leaders if concerns regarding the project surface - Communicate ideas to the participants outside the meetings times

	- Keep meticulous audit trail to include journal - Answer questions as needed - Assist the group in making changes in response to feedback from the participants - Maintain security of the gathered data - Remain open to changes as they develop		- Take part in reviewing images per PV methodology - Join in the process of determining which images best answer the research question - Discuss issues or concerns they encounter while working in the project - Help in deciding what to do with the "answers" that come from this project - Agree who to show the work to, or what to do next - Attend final meeting - Discuss community concerns if they evolve	
After: - Researcher - Community leaders - Participants - Community at large	- Conduct final event as determined by participants - Share results with participants and the larger community as agreed upon by participants - Write results for dissertation and share with participants as agreed upon - Dispose of data as outlined in IRB	- Provide space for final meeting - Communicate feedback to researcher - Discuss results with community at large	- Attend final event - Communicate concerns if they surface - Communicate feedback to community leaders, and researcher	- Attend final event - Communicate feedback to participants, community leaders, and researcher

Appendix E

Timeline

PROPOSED TIME LINE				
Meeting 1 Researcher and Participants	**Meeting 2** Researcher and Participants	**Meeting 3** Researcher and Participants	**Meeting 4** Researcher and Participants	**Meeting 4/5** Researcher and Participants
The researcher will explain the purpose of the study, describe the use of PV, provide an opportunity to opt out and will obtain consent. Participants will learn to use cameras, ethical concerns will be described in detail, the research question will be discussed with participants and they will leave to take photos.	The 1st round of photos will be reviewed and discussed. Participants will be grouped based on age. The research question will be refined and participants will leave to collect more images.	The 2nd round of photos will be reviewed and discussed. The research question will be further refined. It will be determined if a third round of photos should be collected. Participants may seek to collect a third round of images.	Possible 3rd round.	The final round of photos will be examined and discussed. The "best" images, those which most accurately portray the community's concerns, will be identified. As a group, the researcher and the participants will decide how to communicate the identified concerns to the most appropriate audience.
Final meeting (Spring 2019) Researcher, Participants, Community leaders, and Community at large The researcher will return to O'ahu to present the findings of the research to the audience determined by the participants.				

Appendix F

Methodology Summary

Purpose

- Explore RP among Native Hawaiians living in the community of Papakōlea on O‘ahu

Theoretical framework

- Paton’s (2003) Social Cognitive Model of Preparation

Methodology

- Photovoice

Sampling

- A purposive sampling method will be used. Participants will be selected with the help of community leaders based on the criteria below.

Participants

- Native Hawaiians living and working in the community of Papakōlea.

Inclusion/Exclusion Criteria

- Members of the Papakōlea community who self-identify as Native Hawaiian and have lived or worked in Papakōlea for at least three years
- Participants must be 18 years old
- Participants must be able to speak English

Sample Size

- Twelve to fifteen participants
- Four or five participants from three age categories: 18–37, 38–57, and older than 57

Research Site

- The Papakōlea community

Operational Definitions

- Risk: a state of being threatened by an unfavorable or undesired outcome (Slovic, 2000)
- Disaster: an event that causes significant damage to people or things to the extent that people are injured or structures are made useless as an outcome (Landesman, 2011)
- Community: the researcher will clarify the definition of community in partnership with participants and KNNPH

Instruments

- Cameras
- The photos during the photo review/analysis sessions
- Audio recordings
- Field notes

Data Collection

- Participants will take pictures
- The photos will be selected using the SHOWeD method